

## **Appendix A**

**2003 RCRA Facility Investigation – Section 9 BEE including:**

- Vibracore Logs

## 9.0 BASELINE ECOLOGICAL EVALUATION/ECOLOGICAL ASSESSMENT

### 9.1 Introduction

The following is the completed BEE/EA for the North Field/Main Yard, Central Yard and East Yard areas of the Chevron Refinery in Perth Amboy, New Jersey (Figure 9-1). This evaluation was performed, in part, to comply with the surface water and sediment investigation provisions of Chevron's RCRA Corrective Action Permit (RCRA Corrective Action Permit, Appendix A, Scope of Work for RFI) and requests by NJDEP for a BEE pursuant to TRSR Section 3.11. The BEE is limited to an evaluation of ecological receptors and, as requested by the NJDEP, has been prepared in accordance with the BEE format described in the TRSR.

The purpose of the BEE/EA was to identify the potential co-occurrence of:

- Contaminants of ecological concern at the site;
- Environmentally sensitive natural resources, as defined by TRSR Section 1.8, within the site boundaries and/or on properties immediately adjacent to the site; and
- Potential migration pathways and impacts to on-site or adjacent environmentally sensitive natural resources that may be due to site operations.

The sources of information used to complete the BEE are listed in Section 2.0. Also, a BEE site inspection was conducted by TRC Raviv on June 12, 2003.

#### 9.1.1 Environmental Setting

The Refinery is located in an older industrialized, coastal area of New Jersey. The North Field/Main Yard, Central Yard and East Yard areas of the Refinery are situated on a 368-acre site in Perth Amboy, Middlesex County, New Jersey. Figure 2-1 is a general vicinity map showing the Refinery's location. In general, the site is bound to the north by Woodbridge Creek, to the east by the Arthur Kill, to the south by industrial properties, and to the west by the Pennsylvania Railroad tracks. A description of the four geographical areas of the Refinery is provided below:

##### **North Field**

This area consists of ASTs, piping and pumps, the ETP and associated stormwater tanks, and the FFTG. This part of the Refinery is the most heavily associated with waste management including: the Short Term Hazardous Waste Storage Area, the NFB, the Surge Pond, the Leaded Weathering and Fines Transfer Areas, and the Vanadium Pentoxide Reactor Burial Area.

## Main Yard

This area is the primary process area at the Refinery, both presently and historically. Areas include ASTs, Crude Unit No. 5, piping and pumps, bulk loading rack, new Power Plant, and NaSH Plant. This area previously contained Crude Units No. 3 and No. 4, the Hydrotreater and VGO, Hexane Plant, Rheniformer, PA Plant, and Lead Plant which have been demolished and sold for scrap.

## Central Yard

This area includes ASTs, liquid petroleum gas storage vessels, asphalt railcar loading racks, motor fueling station (1 UST), a shop building, and a dumpster area. The Central Yard also formerly contained process units including the Catalytic Cracker, No. 2 Rheniformer, and Alky Plant.

## East Yard

This area consists of ASTs, the Asphalt Plant, asphalt truck loading racks, wharf, EYB, TBA Warehouse (PCB Storage), AAB Plant, Diesel Fuel Station (UST), Truck Scale, and the Administration Building with Annex.

### 9.1.2 Surrounding Land Use

The following industrial properties border(ed) the Refinery:

- Witco Chemical;
- Bird and Sons Landfill;
- Joline Properties;
- ASARCO;
- Amerada Hess;
- American Cyanamid;
- Jadler Metals;
- Haagen-Dazs;
- Englert, Inc.;
- Russel Stanley Corp.;
- CP Chemical Inc.;
- Shell Oil Company; and
- Empire Polymer Corp.

In addition, small businesses along State Street, including R&L Towing, T&I Transmissions, Sylvan Industrial Piping, and Abe Golub Used Cars, border the Central Yard. Residential properties also border the south side of Amboy Field and the West Yard.

The following subsections contain brief descriptions of these properties, including available information regarding potential environmental issues related to their operation.

### **Witco Chemical**

Witco Chemical (Witco) is located at 100 Convery Boulevard, adjacent to the north boundary of Amboy Field. Witco is a RCRA generator and transportation, storage and disposal (TSD) facility that discharges stormwater and non-contact cooling water to Spa Spring Creek under an NJPDES permit. Witco also discharges process water to the Perth Amboy sewers and the Middlesex County Utilities Authority.

The Witco plant established operations in 1948 and produced polyester resins such as ADAP esters, metallic stearates, and surfactants and intermediates, including specialty surfactants such as amines, glycols, and fatty acids.

Virgin and waste heptane, generated at the rate of approximately 1,000 gallons per week, were formerly stored in a UST (until approximately 1986). Various other tanks and reactor vessels store raw materials for a rubber accelerator plant. Waste organic materials from this process are manifested for off-site treatment and/or disposal. The on-site laboratory generates a waste solvent mixture of methanol, toluene, isopropanol, ethanol and pyridine. Other wastes include off-specification raw materials and products as well as cleanup materials including PCB contaminated soils and lead contaminated soils.

### **Bird and Sons Landfill**

The Bird and Sons Landfill site is located near the intersection of Maurer Road and Amboy Avenue, north of the West Yard and west of the North Field/Main Yard area. The landfill on the property reportedly accepted non-chemical industrial waste. Four groundwater wells were located on the property, which were sampled from 1986 to 1989. VOCs were not detected in the samples. Used USTs and other debris are stored on the property. Used UST cleaning operations may have been conducted on the property.

### **Joline Properties, Inc.**

Joline Properties, formerly Bird, Inc., is located on Amboy Avenue along the Pennsylvania Railroad tracks, east and upgradient of the North Field. The property was the site of an asphalt roofing shingle production facility that began processing asphalt materials in the 1920's.

## ASARCO

The ASARCO property is located at 1160 State Street, along the southern boundary of the East Yard. The site is located on the Arthur Kill and during its operational history as a metal smelter and refiner, had an operational pier on the waterway. The ASARCO property was operated as a non-ferrous metal refinery from 1894 to 1976. Releases of various contaminants, including metals have been documented at the ASARCO property.

## Amerada Hess

The Amerada Hess Perth Amboy Terminal is located at the confluence of Woodbridge Creek and the Arthur Kill, along the north side of the East Yard. The Hess facility is a bulk terminal with 45 ASTs with a combined storage capacity of 1.1 million gallons. Products stored include No. 2, No. 4 and No. 6 fuel oil, kerosene, diesel fuel, pour depressant and gasoline. Hess previously stored methanol. Stormwater was managed by three on-site oil/water separators that discharge to Woodbridge Creek and the Arthur Kill.

## American Cyanamid

The American Cyanamid, Inc. facility (Cyanamid) operated on Cutters Dock Road in Woodbridge Township, north of the North Field on the opposite bank of Spa Spring Creek. Cyanamid owned and operated this facility starting in 1932. An NJDEP inspection report (1983) indicates that Cyanamid manufactured industrial chemicals associated with water treatment, paper manufacturing, drilling mud conditioners, and inorganic catalyst used for production of sulfuric acid.

Cyanamid was issued an NJPDES-DGW permit in June 1986 to monitor the potential impact of a lined surface impoundment and a closed one-acre landfill. Groundwater elevation contour maps indicate that the groundwater flow direction beneath the site was towards Spa Spring Creek and Woodbridge Creek. The surface impoundment was a pH equalization/aeration lagoon that was installed in 1974 to receive process water, stormwater runoff, and septic waters generated onsite. The water was reportedly held in the impoundment 24 hours prior to transfer to Woodbridge Township for treatment.

The landfill is located near Spa Spring Creek. The dates operated, contents, and aerial extent were not documented in the files reviewed for this report. The landfill area is visible on 1961 and 1967 aerial photographs. The 1961 aerial photograph shows the landfill encompassing approximately 0.4 acres with its southern boundary within 25 feet of the northern bank of Spa Spring Creek.

## Jadler Metals

Jadler Metals, located at 1060 State Street, reclaimed metals and salvaged used electronic components as a registered hazardous waste generator (USEPA Facility No. NJD980783658). The Jadler facility has been reported to manage mercury relay tubes,

radium-226 bromide tubes, krypton-85 cathode tubes, lead cables, copper wire, and batteries. An NJDEP inspection reported an on-site inventory of 30,000 pounds of mercury tubes, 24 55-gallon drums of less than 50 ppm PCB wastes from electrical components, 1,400 radium bromide tubes, and 16,600 krypton tubes.

### **Englert, Inc.**

Englert, Inc. was located at 1200 Amboy Avenue, west of Chevron's North Field area of the Refinery. The Englert property is separated from the Refinery by the Pennsylvania Railroad tracks. Englert operated a metals processing facility that used heavy metals in solution and generated wastewater from a paint-line manufacturing facility. In addition to heavy metals and solvents, the Englert facility used sodium bisulfates, sulfuric acid, lime and flocculating polymers.

Wastewater was processed by an on-site wastewater treatment plant that generated a heavy-metal sludge, which was sent to S&W Waste in Kearny as a hazardous waste. Waste oil removed by the on-site wastewater treatment facility was burned in an on-site incinerator. The treated wastewater is discharged to the sewer to the Middlesex County Utility Authority.

### **Russel Stanley Corp.**

Russel Stanley was located on Convery Boulevard, northwest of the North Field; it is not directly adjacent to the Refinery. Russel-Stanley was a manufacturer of plastic and steel drums.

### **CP Chemical Inc.**

CP Chemical was located on Arbor Street in the Sewaren section of Woodbridge Township. The CP Chemical facility forms the northern boundary of the Refinery's NFE. CP Chemical performed metals recovery and recovery from various waste materials. Extensive releases and regulatory actions are associated with the CP Chemical facility, including metal (copper, nickel and zinc) releases to soils, groundwater and surface water.

### **Shell Oil Company**

Shell Oil Company is located at 111 State Street in Sewaren. The site borders the Refinery to the North, across Woodbridge Creek and to the north and west of the NFE. The Shell Facility functions as a terminal, distributing gasoline to vendors and storing various petroleum products in ASTs. No processing or refining of petroleum products occurs at the facility. Subsurface contamination has been documented at the site.

### **Empire Polymer Corporation**

Adjacent to the Refinery, at 1031-1057 State Street in Perth Amboy, is the site of the former Empire Polymer Corporation, also known as Express Marketing, Inc. The company

packaged and distributed plastic material. The facility remained operational until April of 1993, when a fire destroyed the building. After the fire, the building was demolished, leaving only an empty lot.

### **9.1.3 Adjacent Surface Water Bodies**

Three surface water bodies border portions of the Refinery along its northern boundary (Spa Spring Creek and Woodbridge Creek) and eastern boundary (Arthur Kill) (see Figure 9-1). In the vicinity of the Refinery, Woodbridge Creek and Spa Spring Creek are tidal estuarine waters. Thus, water flow and elevation in the creeks are controlled by the diurnal tide cycle. Woodbridge Creek is bounded by mudflats and tidally-flowed wetlands, as well as numerous industrial properties. At high tide, the Creek is approximately 100 feet wide as it flows past the Refinery. Woodbridge Creek empties into the Arthur Kill several hundred feet north of the Refinery's East Yard. Spa Spring Creek is a smaller, man made channel that empties into Woodbridge Creek at the NFB area of the Refinery.

The Arthur Kill itself is a tidal strait connecting the Kill van Kull and Newark Bay to the north with Raritan Bay and the Raritan River to the south. Tidal surges come from both ends, with an average flushing time of two weeks and an average semi-diurnal tidal range of 1.6 meters (5.3 feet). The major freshwater inputs are the major tributaries of the Arthur Kill: the Rahway River, the Elizabeth River, and the Fresh Kills, which contribute about 38 percent (122 cubic feet per second ( $\text{ft}^3/\text{sec}$ )), with the balance of 62 percent (200  $\text{ft}^3/\text{sec}$ ) coming from smaller tributaries, sewage treatment plants, combined sewer overflows, and industrial discharges. The salinity of the Arthur Kill varies from 17 to 27 parts per thousand (ppt) at the southern end to nearly freshwater in some of the tributary mouths. The Arthur Kill is surrounded by one of the most densely populated coastal areas in the world.

Vast modifications of the physical features of the Arthur Kill were made to serve the harbor area. The highly industrialized waterway is dredged to an average channel depth of nine meters (30 feet) and much of the shoreline is comprised of bulkheads or rip-rap. In addition to vegetated wetland areas, the vicinity contains extensive interspersed areas of man-made structures, including railroad yards, oil tank farms, bulkheads, docks, road systems, landfills, and numerous industrial and residential buildings, both occupied and abandoned.

Historically, the Refinery has discharged treated wastewaters to outfalls located in Spa Spring Creek and Woodbridge Creek. The Refinery's current NJPDES permitted wastewater discharge is located in Woodbridge Creek.

### **9.1.4 Geology and Hydrogeology**

#### **Site Geology**

The general stratigraphy of the Refinery consists of six major units which overlie the bedrock, including fill, organic clay and peat, glacial till and outwash, and Raritan Formation sand and clay. The surface and shallow soils are composed of fill over large portions of the

site, which is generally less than ten feet thick, but can be up to 20 feet thick. In some areas, the fill appears to be derived from on-site glacial deposits, and consists largely of sand, with variable amounts of silt, clay and gravel. Non-indigenous material in some areas of the fill includes miscellaneous debris, ash, construction debris, and catalyst beads. Fill was placed directly on top of marshland and other existing native soils before the construction of surface impoundments during the 1960's, and fill was used to build up dikes around the edges of the impoundments.

Clay soils beneath the site include the Raritan Fire Clay ranging in thickness from 12 to 20 feet and the Woodbridge Clay, which is less than 50 feet thick. The Farrington Sand is 15 to 25 feet thick and is continuous beneath the site, except at the eastern section adjacent to the Arthur Kill, where it was apparently removed by erosion.

Bedrock was encountered in several deep borings on-site at 65 to 85 feet bgs. There is a layer of saprolite that overlies competent bedrock, which formed from very well-weathered and decomposed rock (either diabase or mudstone of the Lockatong Formation). The saprolite grades upward into the Raritan Fire Clay without a distinct contact. The saprolite appears to be laterally continuous across the site and is typically up to five feet thick.

## **Site Hydrogeology**

The upper water bearing unit at the Refinery is an unconfined shallow water bearing zone that is present within the fill layer. A middle water bearing zone is present within the glacial outwash deposits. The lower water bearing unit is the Farrington Sand, which has been used in the past in the Perth Amboy area as a local public water supply source, or drinking water source unit, but is no longer used for these purposes.

In the northern and eastern areas of the Refinery, the upper water bearing zone in the fill is separated from the water bearing zones in the glacial outwash and Farrington Sand (where present) by the organic clay unit. In the southern and western areas of the Refinery, the organic clay unit pinches out and the water bearing zone in the fill is underlain by the glacial till, or glaciolacustrine clays. The Farrington Sand is further isolated from groundwater within the fill by the Woodbridge Clay. The low permeability clays and silts that separate the permeable water bearing zones are discontinuous.

In general, groundwater is encountered at depths ranging from two feet bgs in the low lying areas of the Refinery, to an approximate maximum depth of 10 feet bgs in the areas of higher elevation. Site data indicate that hydraulic communication between the permeable zones is limited where the intervening low permeability units are present. Historical water level elevations from nested or closely spaced wells screened in the shallow and deep zones vary by as much as four feet. Groundwater flow direction also varies between the zones. Based on limited historical data, the groundwater in the Farrington Sand beneath the Refinery generally flows to the east or southeast, which is similar to the regional flow pattern.

Recent potentiometric data from well pairs, consisting of one well screened across the water table and one well screened below the water table, indicate that there is an upward hydraulic gradient from the native clays and glacial units below the fill towards the water bearing unit in the fill. This upward gradient probably limits the downward migration of dissolved contaminants in the groundwater.

Tidally influenced groundwater level fluctuations and saltwater intrusion into the shallow water bearing zone have been observed and documented in the areas near Woodbridge Creek. Data from wells in the NFB area have shown a tidally related groundwater elevation fluctuation of up to 1.5 feet. In contrast, monitoring wells in the EYB area have shown little tidal influence. This limited tidal influence in the East Yard is attributed to the bulkheads that have been placed along the Arthur Kill. Saltwater intrusion into the Farrington Sand has been documented in the area south of Woodbridge Creek at and near the Refinery.

## 9.2 Environmentally Sensitive Natural Resources

Pursuant to Section 1.8 of the TRSR, environmentally sensitive natural resources include wetlands, groundwater, surface water and other areas (see Table 9-1). For this BEE, groundwater is evaluated as a potential migration pathway only. According to Section 4.7 of the TRSR, ecological assessment of groundwater as a receptor is not required.

**Table 9-1. Environmentally Sensitive Area Review**

Environmentally Sensitive Area (as per N.J.A.C. 7:1E-1.8)	Presence at or Immediately Adjacent to Site
Surface waters	Yes (Arthur Kill, Spa Spring Creek and Woodbridge Creek)
Sources of water supply	No
Bay islands and barrier island corridors	No
Beaches	No
Dunes	No
Wetlands and wetland transition areas	Yes
Breeding areas for forest area nesting species, colonial water birds or aquatic furbearers	Potentially yes (Arthur Kill and Woodbridge Creek)
Migratory stopover areas for migrant shorebirds, raptors or passerines	Potentially yes (Woodbridge Creek)
Wintering areas (including coastal tidal marshes and water areas), waterfowl concentration areas and Atlantic White Cedar stands	Potentially yes (Arthur Kill)
Prime fishing areas	No
Finfish migratory pathways	Yes
Special submerged vegetation areas	No
Shellfish harvesting waters	No
Forest areas (prime and unique forest land)	No
Federal and State-listed threatened or endangered species	No
Federal and State wilderness areas	No
Federal and State Wild and Scenic River	No

In addition to a site inspection (summarized below), the following sources of information were used to evaluate whether any environmentally sensitive natural resources are on or immediately adjacent to the Project site:

- Perth Amboy U. S. Geological Survey (USGS) Topographic Quadrangle Map.
- NJDEP, Perth Amboy SE, Freshwater Wetlands Map.
- U.S. Department of Intererior (USDOI). National Wetlands Inventory, Perth Amboy Quadrangle.
- NJDEP's GIS - 1995/1997 version.
- USDOI Fish and Wildlife Service Correspondence. March 15, 1999.
- NJDEP Office of Natural Lands Management for a Natural Heritage Program. Correspondence dated March 24, 1999.
- BCM Engineers' Letter of Interpretation Request. Chevron U.S.A., Inc. RCRA Closure Perth Amboy Refinery. March 1990.
- Chevron Perth Amboy Refinery, *Description of Current Conditions*, Vol. 1. August 26 1994.
- Chevron Products Company Perth Amboy, NJ. *Request for Renewal of Waterfront Development Permit No. 1216-90-0001.3, Freshwater Wetlands Transition Area Waiver No. 1216-90-0001.5 and Freshwater Wetlands Letter of Interpretation No. 216-90-0001.2 - FWLI Request for Re-authorization Under Freshwater Wetlands Statewide General Permit No. 6*. December 26, 1996.
- Chevron. *1st-Phase RFI Soils Report*. January 1997.
- Foster Wheeler Environmental Corporation. *Preparedness, Prevention and Contingency Plan Volume B (Addendum to Volume B) for Chevron Products Company*. May 1999.
- Chevron. *West Yard Baseline Ecological Evaluation*. April 19, 2001.
- Chevron Environmental Management Company Perth Amboy, New Jersey. *Refinery Quarterly Progress Report*. June 2001 (Report No. CA00-2, CA00-3, and CA00-4).
- Chevron. *Full RCRA Facility Investigation Workplan*. October 2001.
- Chevron Environmental Management Company Perth Amboy, New Jersey. *Refinery Quarterly Progress Report*. December 2001 (Report No. CA01-1 and CA01-2).
- Chevron Environmental Management Company Perth Amboy, New Jersey. *Refinery Quarterly Progress Report*. August 2002. (Report No. CA01-3 and CA01-4).

- DRAI. *Health and Safety Plan Module for Sediment and Surface Water Investigation Arthur Kill, Woodbridge Creek and Spa Spring Creek*. December 10, 2002.
- Chevron U.S.A. Perth Amboy, New Jersey. *RCRA Corrective Action Project Stabilization Measures Status Report*. January 2003. (3rd Quarter 2001 and 4th Quarter 2001 Reports).
- Chevron. *Refinery Quarterly Progress Report – 3rd and 4th Quarter 2002* (Reporting period: July 1, 2002 – December 31, 2002). April 7, 2003.

The identification of environmentally sensitive areas based on a review of the above-referenced sources is discussed below.

### **9.2.1 USGS Topographic Quadrangle**

Based on the USGS Perth Amboy, NJ-NY Topographic Quadrangle (Figure 9-1), the nearest surface water bodies are the Arthur Kill, located adjacently east of the site; Spa Spring Creek, located adjacently north of the site; and Woodbridge Creek, located adjacent and northeast of the site. The regional topography slopes gently downward to the east. Local and site surface drainage is to the northeast, and is controlled by excavated storm drainage swales, ditches and culverts. Stormwater runoff from the former process plants on the site generally flows into the OWSS.

### **9.2.2 Wetlands Maps**

The following wetlands maps were reviewed as part of the BEE to identify wetland areas that are present on and adjacent to the site:

- NJDEP's Freshwater Wetlands Map for southeast Perth Amboy, New Jersey - New York Quadrangle (Figure 9-2);
- USDOI's National Wetlands Inventory Map for Perth Amboy (Figure 9-2); and
- Site-specific wetland delineation maps prepared for letters of interpretation as described in Section 2.0 (Figure 9-3).

The following descriptions of the wetland maps include information obtained from field observations made in the site-specific wetland delineation (Section 2.0) and the BEE site inspection (Section 9.2.6).

#### **9.2.2.1 NJDEP Wetland Map**

The NJDEP's Freshwater Wetlands Map for the Southeast Perth Amboy, New Jersey – New York Quadrangle (Figure 9-2) classifies the majority of the site as upland (i.e., non-wetlands). The map depicts three on-site wetland areas in the northeast and east portions of the site, and two wetland areas that are present along the north, northeast and east property lines. The two on-site areas in the northeast are classified as permanent palustrine

diked/impounded open water. These features are the NFB and the Surge Pond, which are regulated surface impoundments currently being closed under an NJPDES permit. The third on-site area, located in the East Yard near the waterfront, is identified as a permanent palustrine excavated open water. This feature is the EYB, which is also a regulated surface impoundment being closed under the NJPDES permit.

The two wetlands areas located along the north, northeast and eastern property lines include a lower perennial riverine system with an unconsolidated mud bottom along the northern property boundary (Spa Spring Creek) and unclassified subtidal, intermittently flooded wetlands along the northeast property line (Woodbridge Creek) and east of the site (Arthur Kill).

#### **9.2.2.2 USDOI Wetlands Map**

Four wetland areas are identified on the USDOI's National Wetlands Inventory Map for Perth Amboy (Figure 9-2). A large area is identified as an open water palustrine system with an unknown bottom in the northern portion of the site adjacent to Woodbridge Creek. This area comprises the NFB and Surge Pond, which are in the process of being closed, as described above.

Both the Arthur Kill to the east and Woodbridge Creek northeast of the site are designated as estuarine subtidal open waters. The area of the Arthur Kill adjacent to the East Yard bulkhead is classified as an estuarine intertidal flat. A palustrine intertidal wetland area with emergent vegetation is also identified on the south bank of Woodbridge Creek northeast of the Central Yard.

#### **9.2.2.3 Site-Specific Wetland Delineation**

Based on previous investigations summarized in Section 2, a 3.2-acre intermediate resource value estuarine intertidal emergent wetland is present adjacent to Spa Spring Creek and Woodbridge Creek, along the north and northeast property lines (Figure 9-3).

### **9.2.3 NJDEP Geographical Information System**

The NJDEP's 1995/1997 GIS database was reviewed to identify environmentally sensitive natural resources. The NJDEP's GIS database includes geo-coded files that represent types of land use and land cover for the entire state. The available GIS land use/land cover areas and types reviewed for this BEE are included on Figure 9-4.

The NJDEP's GIS database identifies the majority of the project area site as industrial and urban/built-up land. Environmentally sensitive areas on or adjacent to the site include creeks, surface tidal waters and artificial lakes the north, northeast and east. The land use in the vicinity of the site is largely industrial. In general, the wetland areas identified in the GIS database correspond to the wetland areas shown on the NJDEP and USDOI Wetland Maps.

### **9.2.4 NJDEP's Natural Heritage Program Database**

Foster Wheeler Environmental Corporation of Livingston, New Jersey, submitted a request to the NJDEP Office of Natural Lands Management for a Natural Heritage Program database review of threatened or endangered plant and animal species known to exist on-site or in the surrounding area. The NJDEP issued a response letter dated March 24, 1999 indicating that there are no records in the database of any rare plants, animals or natural communities in the vicinity of the site. A copy of the NJDEP Natural Heritage Program database correspondence is included as Appendix H.

### **9.2.5 U.S. Fish and Wildlife Service**

Foster Wheeler Environmental Corporation submitted a request to the USDOI Fish and Wildlife Service for a review of the site pursuant to the Endangered Species Act (ESA) of 1973. According to the U.S. Fish and Wildlife Service, there are two documented occurrences of swamp pink (*Helonias bullata*), a federally listed threatened plant species. Based on the site inspection, spartina grass and phragmites dominate the wetland areas at the confluence of Spa Spring Creek and Woodbridge Creek. In addition to swamp pink, the peregrine falcon (*Falco peregrinus*), a federally listed endangered species, nests within the 15-mile study area. There is also the occasional transient bald eagle (*Haliaeetus leucocephalus*), a federally listed threatened species that may occur in the study area. However, the study area is a radius of 15 miles and the threatened and endangered species described are not expected to occur on or adjacent to the site. A copy of the U.S. Fish and Wildlife Service correspondence dated March 15, 1999 is included as Appendix I.

### **9.2.6 BEE Site Inspection**

TRC Raviv conducted an inspection of the site and surrounding properties on June 12, 2003. The purpose of the inspection was to provide field verification of the wetland maps, and identify any additional environmentally sensitive areas and evidence of potential impacts such as stressed/dead vegetation, discolored soil/sediment, sheens on surface water, or the presence of seeps and discharges. All on-site and adjacent surface waters and wetland areas identified at the site were included in the inspection. Photographs taken during the site inspection are included as Appendix J.

#### **Site Inspection Summary**

TRC Raviv inspected the wetland areas surrounding the Refinery, particularly along the Arthur Kill, Spa Spring Creek and Woodbridge Creek. In general, the wetland areas inspected appear to be consistent with the federal and state wetland map descriptions, including estuarine, intertidal wetlands, open water palustrine wetlands and lower perennial riverine system wetlands.

The inspection was conducted during low tide and mud flats were exposed along the banks of the creeks. Communities of spartina and phragmites dominate the wetland vegetation in the

wetland areas inspected. Wildlife observed during the inspection included mallards and egrets that were present at a few locations near the banks of Woodbridge Creek.

Small amounts of miscellaneous solid waste (e.g., tires, clothing, plastic, wood, etc.), apparently transported and deposited from off-site sources by tidal flow, were observed throughout the adjacent wetland areas along Woodbridge Creek. However, there was no evidence of stressed or dead vegetation along the banks of Spa Spring Creek and Woodbridge Creek, and no sheens were observed on the water surface at the time of the inspection. However, a small water seep was observed on the southeast corner of the concrete secondary wastewater treatment unit.

The ground surfaces along the banks of Spa Spring and Woodbridge Creeks were either paved or a berm was present to direct runoff away from the stream channels and toward the site. In some areas of the Refinery boundary, especially around Spa Spring Creek, vegetated buffers exist along the bank between the Refinery roadway and the stream bed. There was no evidence of stormwater runoff (e.g., erosion channels, ditches or discrete conveyances) observed anywhere along the creek banks on the Refinery site at the time of the inspection.

The site boundary to the east that borders the Arthur Kill is comprised of a bulkhead and shipping terminal dock. Steel sheet piling is visible at the surface for much of the property line that forms the contact with the water's edge. The southern area of the wooded wharf appears to be failing, and some minor local erosion of soil has occurred. However, there is no evidence of any discharges from this area to the Arthur Kill, such as oily sheens, staining or discoloration.

### **9.2.7 Conclusions**

Based on the above review, environmentally sensitive areas are present adjacent to the site, including small areas of intertidal estuarine wetlands and open water palustrine systems associated with Spa Spring Creek and Woodbridge Creek located to the north and northeast, and the Arthur Kill, located to the east of the site.

Although miscellaneous solid waste that appears to have been deposited from tidal flow was observed throughout the wetland areas, there was no evidence of stressed or dead vegetation along the banks of Spa Spring Creek and Woodbridge Creek, and no sheens were observed on the water surface in any of the water bodies adjacent to the site at the time of the inspection.

## **9.3 Contaminants of Potential Ecological Concern**

In accordance with Section 3.11(a)1 of the TRSR, COPECs include substances that exhibit the ability to biomagnify, bioaccumulate, or that exceed available ecological criteria or guidelines. To identify COPECs, TRC Raviv reviewed existing soil, groundwater, surface water and sediment data that are available for the site from prior and recent investigations. These data, which were included in Chevron's October 2001 *Full RCRA Facility*

*Investigation Workplan* and the other documents listed in Section 9.2, were summarized and evaluated to identify COPECs in the following sections.

### **9.3.1 SWMUs and AOCs Located Adjacent to Environmentally Sensitive Areas**

There are 44 SWMUs and 35 AOCs within the North Field/Main Yard, Central Yard and East Yard areas of the Chevron Refinery, most of which are located interior to the site boundaries. The SWMUs and AOCs that are adjacent to the surface water bodies that border the property are listed below.

#### **North Field**

The North Field area of the Refinery is bordered by Spa Spring Creek to the north and by Woodbridge Creek to the east. The SWMUs and AOCs that are located adjacent to Spa Spring Creek in the North Field area include:

- SWMU 27: TEL Weathering Area;
- SWMU 28: Reactor Burial;
- SWMU 29: Fines Transfer Area;
- SWMU 30: Short-Term Storage Area;
- SWMU 38: North Field Slop Pond;
- SWMU 39: Unnamed North Field Pond;
- AOC 5: Petroleum Substance Near Former UST E3; and
- AOC 7: Tarry Material at MW-13

The SWMUs in the North Field area that are located adjacent to Woodbridge Creek include:

- SWMU 1: North Field Basin;
- SWMU 2: Surge Pond;
- SWMU 7: TEL Burial – 2 Burials (southeast of Tank 305);
- SWMU 24: TEL Weathering Area (east of Tank 9209, south of the ETP);
- SWMU 31: Effluent Treatment Plant;
- SWMU 40: Old Pond; and
- SWMU 41: Drying Area.

No AOCs are identified adjacent to Woodbridge Creek.

## East Yard

The East Yard area of the Refinery is bordered by the Arthur Kill to the east. The SWMUs and AOCs that are located adjacent to the Arthur Kill in this area include:

- SWMU 25: TEL Weathering Area (north of East Yard Basin);
- SWMU 26: TEL Weathering Area (south of East Yard Basin);
- SWMU 36: Oil/Water Separator near East Yard Basin;
- AOC 13: B-11 Oily Fill Area; and
- AOC 29: 5 Berth Area.

### 9.3.2 Soil

The soil data described in Section 6 were used to develop an initial list of site-related COPECs by identifying those hazardous substances detected in the on-site soils at concentrations above the RFI Soil Delineation Criteria. A summary of the soil sample analytical results is included on Table 6-2, along with total numbers of analyses per constituent and the percentage of the samples exceeding the delineation criteria.

The following summary (Table 9-2) is limited to the constituents in soils found at concentrations above the delineation criteria that were also detected in sediment and/or surface water samples above their respective ecological screening criteria (see Section 9.3.5):

**Table 9-2. Constituents Found in Soils and Sediment or Surface Water Above Criteria**

Parameter (mg/kg)	Maximum Concentration in Soil	% of Samples Exceeding Criteria	Delineation Criteria
<b>VOCs</b>			
Benzene	26,000	12%	1
Ethylbenzene	160,000	1%	100
Toluene	9,700	1%	500
Xylenes	220,000	4%	67
<b>SVOCs</b>			
Benzo(a)anthracene	54	10%	0.9
Benzo(a)pyrene	71	12%	0.66
Benzo(b)fluoranthene	40	8%	0.9
Benzo(k)fluoranthene	19	2%	0.9
Chrysene	86	0.1%	62
Dibenz(a,h)anthracene	4.9	2%	0.66
Indeno(1,2,3-cd)pyrene	11	3%	0.9
Naphthalene	450	1%	100
Pyrene	110	0.1%	100

**Table 9-2. Constituents Found in Soils and Sediment or Surface Water Above Criteria**

<b>Parameter (mg/kg)</b>	<b>Maximum Concentration in Soil</b>	<b>% of Samples Exceeding Criteria</b>	<b>Delineation Criteria</b>
<b>Metals</b>			
Antimony	228	5%	14
Arsenic	117	15%	20
Copper	3,450	3%	600
Lead	145,000	11%	400
Mercury	29	0.2%	14
Nickel	3,080	2%	250
Zinc	10,500	1%	1,500

It should be noted that the calculations for percent of samples exceeding the delineation criteria are based on a robust data set, with the total numbers of soil analyses ranging from 369 to 744 analyses per constituent. Based on the soil data, the substances listed in the table above were all detected at low frequencies (i.e., less than 15 percent). Of the 20 substances listed, only seven were found above the delineation criteria at detection frequencies above 5%. Four organic compounds (benzene, benzo(a)anthracene, benzo(a)pyrene and benzo(b)fluoranthene) were detected above the delineation criteria in more than 5 percent of soil samples. Three metals (antimony, arsenic and lead) were detected above the delineation criteria in more than 5 percent of soil samples.

Based on Section 6, all contaminated soil areas in SWMUs and AOCs located adjacent to environmentally sensitive areas (i.e., adjacent surface water and wetlands) have been delineated. Soil contamination does not appear to extend into the nearby water bodies in any of these areas. Potential migration pathways, such as surface erosion of soils, are evaluated in Section 9.6.

### 9.3.3 Groundwater

The groundwater data described in Section 8 was used to develop an initial list of site-related COPECs by identifying those hazardous substances detected in the on-site groundwater at concentrations above the RFI groundwater delineation criteria. A summary of the groundwater sample analytical results is included on Table 9-3, along with total numbers of analyses per constituent and the percentage of the samples exceeding the criteria.

**Table 9-3. Summary of COCs Detected in Groundwater Above Criteria**

COC Detected Above Delineation Criteria ( $\mu\text{g/L}$ )	Full RFI Delineation Criteria	Sitewide			
		Maximum Concentration Detected	Number of Exceedances	Number of Samples	% Exceeded
<b>Volatiles</b>					
1,1,1-Trichloroethane	30	2,100	3	201	1.5%
1,1-Dichloroethane	70	75	1	201	0.5%
1,1-Dichloroethene	2	220	8	201	4.0%
1,2-Dibromoethane	0.05	5	1	191	0.5%
1,2-Dichloropropane	1	7	1	201	0.5%
1,4-Dichlorobenzene	75	250	1	211	0.5%
Benzene	1	6,300	58	220	<b>26.4%</b>
Bromodichloromethane	1	6	1	201	0.5%
Chlorobenzene	4	580	2	201	1.0%
Chloroform	6	24	1	201	0.5%
cis-1,2-Dichloroethene	10	88	3	201	1.5%
Cyclohexane	100	930	13	191	<b>6.8%</b>
Ethylbenzene	700	3,600	5	220	2.3%
methyl t-butyl ether	70	240	3	191	1.6%
Methylcyclohexane	100	370	5	191	2.6%
Tetrachloroethene	1	37	4	201	2.0%
Toluene	1,000	6,500	3	220	1.4%
Trichloroethene	1	1,400	5	201	2.5%
Vinyl chloride	5	21	2	201	1.0%
Xylene (total)	1,000	25,000	12	220	<b>5.5%</b>
<b>Semi-Volatiles</b>					
2,4-Dimethylphenol	100	55,000	6	201	3.0%
2-Methylnaphthalene	100	180	3	191	1.6%
2-Methylphenol	100	77,000	3	191	1.6%
4-Methylphenol	100	87,000	3	191	1.6%
Benzo(a)anthracene	0.2	24	6	211	2.8%

**Table 9-3. Summary of COCs Detected in Groundwater Above Criteria**

COC Detected Above Delineation Criteria ( $\mu\text{g/L}$ )	Full RFI Delineation Criteria	Sitewide			
		Maximum Concentration Detected	Number of Exceedances	Number of Samples	% Exceeded
Benzo(a)pyrene	0.2	39	6	211	2.8%
Benzo(b)fluoranthene	10	19	1	211	0.5%
Benzo(k)fluoranthene	1	4	2	211	0.9%
bis(2-Ethylhexyl)phthalate	30	560	7	211	3.3%
Caprolactam	100	270	5	191	2.6%
Carbazole	5	11	1	191	0.5%
Chrysene	5	36	3	216	1.4%
Dibenz(a,h)anthracene	0.5	9	7	211	3.3%
Indeno(1,2,3-cd)pyrene	10	11	1	211	0.5%
Naphthalene	300	550	4	220	1.8%
N-Nitrosodiphenylamine	20	73	2	211	0.9%
Pentachlorophenol	1	14	1	191	0.5%
Phenol	4,000	18,000	2	191	1.0%
<b>Metals</b>					
Aluminum	200	6,550	49	182	<b>26.9%</b>
Antimony	20	69.2	2	182	1.1%
Arsenic	8	408	52	192	<b>27.1%</b>
Cobalt	100	548	9	182	4.9%
Lead	10	172	19	212	<b>9.0%</b>
Manganese	50	37,800	174	182	<b>95.6%</b>
Nickel	100	400	11	204	<b>5.4%</b>
Thallium	10	126	19	182	<b>10.4%</b>

Indicator COCs and maximum concentrations are highlighted in bold.

If % of exceedances is 5% or greater, the number is also highlighted in bold.

The following summary (Table 9-4) is limited to the constituents in groundwater found at concentrations above the delineation criteria that were also detected in sediment and/or surface water samples above their respective ecological screening criteria (see Section 9.3.5):

**Table 9-4. Constituents Found in Groundwater and Sediment or Surface Water Above Criteria**

Parameter ( $\mu\text{g/L}$ )	Maximum Concentration in Groundwater	% of Samples Exceeding Criteria	Delineation Criteria
<b>VOCs</b>			
Benzene	6,300	26.4%	1
Ethylbenzene	3,600	2.3%	700
Xylenes	25,000	5.5%	1,000
<b>SVOCs</b>			
2-Methylnaphthalene	180	1.6%	100
Benzo(a)anthracene	24	2.8%	0.2
Benzo(a)pyrene	39	2.8%	0.2
Benzo(k)fluoranthene	4	0.9%	1
Chrysene	36	1.4%	5
Debenz(a,h)anthracene	9	3.3%	0.5
Indeno(1,2,3-cd)pyrene	11	0.5%	10
Naphthalene	550	1.8%	300
<b>Metals</b>			
Antimony	69.2	1.1%	20
Arsenic	408	27.1%	8
Lead	172	9.0%	10
Nickel	400	5.4%	100

The percentages of samples exceeding the delineation criteria are calculated based on a relatively large data set, with total numbers of groundwater analyses ranging from 182 to 220 analyses per constituent collected over the past two years. Based on the groundwater data, the substances listed in the table above were all detected at moderately low frequencies (i.e., less than 28 percent). Of the 15 substances listed, only five were found above the delineation criteria at detection frequencies above 5 percent. Two VOCs (benzene and xylene) were detected above the delineation criteria in more than 5 percent of groundwater samples. Three metals (arsenic, lead and nickel) were detected above the delineation criteria in more than 5 percent of the samples.

Nearly all of the groundwater samples containing elevated constituent concentrations were collected from monitoring wells that are not located near the surface water bodies adjacent to the site. As described in Section 8, the groundwater quality in the sentinel wells located adjacent (i.e., immediately upgradient) to the off-site water bodies is generally within the delineation criteria for the monitoring parameters analyzed.

The constituents detected in the fourth quarter 2002 groundwater samples at concentrations above the delineation criteria, that are also identified at elevated concentrations in sediment and/or surface water samples (see Section 9.3.5), are presented on Figure 9-5. Based on the distribution of sample locations where these substances appear at elevated concentrations, the groundwater does not generally appear to be impacted in areas close to the surface water bodies. Elevated concentrations of benzene, arsenic and/or nickel were detected in groundwater samples collected during the fourth quarter 2002 sampling round from four monitoring wells (Table 9-5):

**Table 9-5. Fourth Quarter 2002 Groundwater Exceedances**

MW Number	AOC/SWMU	Constituent	Concentration ( $\mu\text{g}/\text{L}$ )
MW-13	AOC 7	Arsenic	16.1
MW-13	AOC 7	Nickel	314
NF-13	SWMU 1	Nickel	163
MW-124	SWMU 24	Arsenic	8.7
MW-155	AOC 29	Benzene	2

These data are evaluated further for comparison with sediment and surface water quality data in Section 9.3.5. However, it should be noted that these concentrations are relatively low and do not suggest a significant potential for off-site contribution of arsenic, nickel or benzene to off-site receptors in the vicinity of the individual well locations.

### 9.3.4 LNAPL

Based on Chevron's September 23, 2002 *LNAPL Management Plan*, an LNAPL Investigation was conducted as described in Section 7. Based on that investigation, LNAPL was found in 17 areas at the Refinery. However, none of the LNAPL areas intersect any of the environmentally sensitive areas identified adjacent to the site.

### 9.3.5 Sediments and Surface Water Sample Collection and Analysis

TRC Raviv collected sediment and surface water samples from the Arthur Kill, Spa Spring Creek and Woodbridge Creek on December 17, 18, 19 and 20, 2002. The purpose of the sampling was to characterize the sediments and surface water in the Arthur Kill and the two creeks, characterize background conditions, and evaluate potential impacts from the adjacent Refinery. Forty-two sediment and 17 surface water samples were collected in accordance with NJDEP's *Field Sampling Procedures Manual* and the TRSR (TRSR; NJAC 7:26E). All of the surface water samples were collected near the sides of the creek channels. Sediment samples were collected from both sides and the middle of the creek. The sediment samples obtained from the sides of the creek were collected from depositional zones.

Lancaster Laboratories of Lancaster, Pennsylvania, a New Jersey-certified laboratory, analyzed all of the samples. All sediment samples were analyzed for TCL VOCs, TCL SVOCs, TAL metals, TOL, nitrate, nitrite, TKN, ammonia, TOC, pH and particle grain size.

All surface water samples were analyzed for TCL VOCs, TCL SVOCs, total TAL metals, dissolved TAL metals, total hardness (as CaCO<sub>3</sub>), TSS, turbidity, chlorides, nitrate, nitrite, TKN, ammonia and sulfate.

## Sediments

Sediment samples were collected by EEA, Inc. of Garden City, New York using boat-mounted vibratory coring (vibracore) equipment. Sampling in the Arthur Kill was completed using a 55-foot R/V Walford equipped with a pneumatic vibracore device. A 19-foot Carolina skiff with a forward mounted A-frame and Rossfelded P-1 electric vibratory corer was used to obtain sediment samples from Woodbridge and Spa Spring Creeks.

The vibracore sampler consists of an electric or pneumatic vibratory head that drives a three-inch diameter, eight-foot stainless steel core barrel lined with a dedicated six-mil HDPE liner. During sampling, the liners are extruded and cut open for processing and new liners are installed prior to collecting each core.

Vibracore sediment samples were collected from each of three locations along each transect, unless otherwise noted below. One vibracore was collected in the middle of the creek and two were collected on either side of the creek within depositional zones. Samples collected from the side of the creek opposite the Refinery were designated "A", those collected from the middle "B", and those adjacent to the Refinery "C". In the Arthur Kill, vibracores were only collected on the Refinery (C) side of the Kill.

Vibracores were advanced into the Arthur Kill sediments to a depth of 12 feet below the top of sediment or until refusal, whichever came first. Vibracores were advanced into Woodbridge Creek and Spa Spring Creek sediments to a depth of eight feet below the top of sediment or until refusal, whichever came first. Refusal is defined as the point at which the vibratory sampler cannot penetrate the sediments any further due to dense subsurface conditions.

Twenty-nine sediment samples were obtained from Woodbridge Creek Transects SED-1, 2, 3, 4, 5, 6, 9 and 10; six sediment samples were obtained from Spa Spring Creek Transects SED-7, 8 and 11; and seven sediment samples were collected from Arthur Kill Transects SED-13, 14, 15, 16, 17 and 18 (Figures 9-6, 9-7 and 9-8). Sediment samples were collected from three locations at most creek transects, including the side closest to Chevron (C), opposite side of the creek (A) and center of the creek (B). At each location, samples were collected from the zero to six-inch interval below the sediment surface (bs), six to 12-inch interval bs, or both. Additional sediment samples were collected at deeper intervals in some locations, based on field observations.

Prior to disturbing the core, a TCL VOC sample was collected from the six to 12 inch interval of each vibracore using methanol extraction/preservation. The sediment cores were then visually inspected and field screened using a photo-ionization detector (PID). When evidence of contamination appeared deeper within the vibracore, additional samples were

collected at those intervals. Additional samples were collected at SED-3-C, SED-4-A and SED-9-C.

Vibracore samples were not collected at sampling locations SED-11-A and SED-8-B due to refusal of the vibratory sampler at the sediment surface. A vibracore sample was not attempted at the SED-11-B location due to the narrowness of the stream. Also, transect 11 was relocated to the east side of the railroad bridge due to obstructions that would not allow the boat and crew to pass underneath the bridge. Vibracore logs are attached in Appendix D.

As part of this review, the sediment analytical results were compared to criteria provided in the NJDEP's 1998 *Guidance for Sediment Quality Evaluations* (GSQE). The GSQE includes Marine/Estuarine Sediment Screening Guidelines (SSG) for selected VOCs, PAHs, PCBs, pesticides and metals in sediment. The SSG are divided into two groups: effects range-low (ER-L), which represent concentrations at which adverse benthic impacts are found in approximately 10 percent of studies, and effects range-median (ER-M), which represent concentrations at which adverse benthic impacts are found in approximately 50 percent of studies. In accordance with the GSQE, the ER-L was used to screen the sediment data for this BEE. However, the GSQE allows for a "weight-of-evidence/professional judgment" approach when evaluating sediment data that exhibit concentrations marginally higher than ER-L. Therefore, the ER-M is included to provide a reference for evaluating the significance of sediment sample concentrations that are above ER-L.

The maximum values for contaminants detected above ER-L in the sediment samples are provided below (Table 9-6), with the respective ER-L and ER-M and frequency of detection above the ER-L. The sediment data is presented on Tables 9-7 through 9-11 (presented at the end of this section), and Figures 9-6 through 9-8.

**Table 9-6. Maximum Sediment Concentrations**

Parameter (mg/kg)	Maximum Concentration	NJDEP SSG		Samples >ER-L Per Total
		ER-L	ER-M	
<b>VOCs</b>				
Benzene	20	0.34	CV	4/42
Ethylbenzene	6.6	1.4	CV	3/42
Toluene	2.9	2.5	CV	1/42
Xylene (total)	29	0.12	CV	5/42
<b>SVOCs</b>				
2-Methylnaphthalene	39	0.07	0.67	10/42
Acenaphthene	3.9	0.016	0.5	30/42
Acenaphthylene	1.2	0.044	0.64	28/42
Anthracene	3.1	0.085	1.1	29/42
Benzo(a)anthracene	6.5	0.261	1.6	30/42
Benzo(a)pyrene	13	0.43	1.6	29/42
Benzo(g,h,i)perylene	18	0.17	320	33/42

**Table 9-6. Maximum Sediment Concentrations**

<b>Parameter (mg/kg)</b>	<b>Maximum Concentration</b>	<b>NJDEP SSG</b>		<b>Samples &gt;ER-L Per Total</b>
		<b>ER-L</b>	<b>ER-M</b>	
Benzo(k)fluoranthene	1.3	0.24	1,340	27/42
Chrysene	11	0.384	2.8	29/42
Dibenzo(a,h)anthracene	4	0.063	0.26	29/42
Fluoranthene	6.4	0.6	5.1	29/42
Fluorene	5.8	0.019	0.54	29/42
Indeno(1,2,3-cd)pyrene	4.1	0.2	320	29/42
Naphthalene	10	0.16	2.1	7/42
Phenanthrene	18	0.24	1.5	25/42
Pyrene	13	0.665	2.6	30/42
Total PAHs	140.57	4	45	31/42
<b>Metals</b>				
Antimony	7.9	2	25	7/42
Arsenic	164	8.2	70	35/42
Cadmium	13	1.2	9.6	28/42
Chromium	198	81	370	16/42
Copper	8030	34	270	37/42
Lead	656	47	218	34/42
Mercury	7	0.15	0.71	30/42
Nickel	2480	21	52	41/42
Silver	7.9	1	3.7	22/42
Zinc	2970	150	410	35/42

CV = Chronic Value SSG

Chemical constituents exceeding ER-Ls were detected in background sediment sample locations, as well as locations adjacent to the Refinery. Also, staining and/or petroleum odors were noted in sediment cores at several locations, including in several potential background locations in Woodbridge Creek sediment samples obtained from sampling transects SED-09 and SED-10 (see Vibracore Logs in Appendix D). However, stained sediments were not observed in any of the Arthur Kill cores. The presence of stained sediments is noted on Figures 9-6, 9-7 and 9-8 for samples that also exhibited elevated contaminant concentrations.

BTEX compounds were the only VOC constituents detected at elevated concentrations in both the off-site sediments and in on-site groundwater samples. However, BTEX compounds were detected at a very low frequency in the sediment (two to 11 percent). Benzene was only found in four sediment samples, ethylbenzene was only detected in three sediment samples, toluene was only found in one sediment sample, and xylenes were found in five of the 42 sediment samples.

Benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, 2-methylnaphthalene, naphthalene, phenanthrene and pyrene were SVOCs detected at elevated concentrations in both the off-site sediments and on-site groundwater or soil samples.

2-Methylnaphthalene and naphthalene were detected at a relatively low frequency (15 to 24 percent). The remaining SVOC constituents were detected at a higher frequency in the sediment (62 to 71 percent). However, the detection frequencies for VOCs and SVOCs in on-site soils and groundwater are low. Only benzene and xylenes were detected at a frequency above 5 percent in groundwater. Also, the only compounds that exhibit a detection frequency above 5 percent in soils include benzene, benzo(a)anthracene, benzo(a)pyrene and benzo(b)fluoranthene.

Silver, arsenic, cadmium, copper, mercury, lead, nickel and zinc were detected at a relatively high frequency in the sediment (52 to 95 percent); antimony and chromium were detected at a lower frequency (13 to 32 percent). However, only arsenic, nickel and lead were also found at elevated concentrations in on-site groundwater samples at detection frequencies above 5 percent. In addition, arsenic, lead and antimony were the only metals that were also detected at elevated concentrations in on-site soils at frequencies above 5 percent.

## Surface Water

Most of the surface water samples were collected from the sediment sampling boats using laboratory-provided glassware. All surface water samples were collected prior to sediment sample collection to avoid disturbing the water column. Surface water samples were collected from the Arthur Kill on December 17, 2002, between 11:00 a.m. and 3:00 p.m., during ebb tide.

With the exception of SW-10-C, the surface water samples were collected on December 18, 2002, during ebb tide between 8:55 a.m. and 3:45 p.m., starting from downstream locations in Woodbridge Creek continuing towards upstream locations. After collecting surface water sample SW-9-C at Transect 9, the tide was too low to navigate further upstream in Woodbridge Creek or upstream in Spa Spring Creek. Surface water samples from Spa Spring Creek were collected by hand due to the shallow water conditions (0.5 to 1 foot deep water). Surface water sample SW-10-C was collected at high tide the following day (December 19, 2002) at 9:25 a.m. Due to the high tide, Transect 10 was relocated to the south side of the New Jersey Turnpike. The boat and crew could not fit under the bridges. All sampling locations are tidally influenced.

The VOC sample was collected first at each location using a Van-Dorn water sampler approximately one foot above the top of sediment to avoid disturbing the water column. A Van-Dorn water sampler is capable of collecting a sample from a discrete interval. After collecting the VOC sample, a peristaltic pump was used to collect samples for the remaining parameters. Weighted Teflon® tubing was placed approximately one foot above the top of sediment and the samples were pumped directly into the sample jars. Dedicated, disposable Teflon® and Masterflex® tubing were used at each sample location.

Eight surface water samples (SW-1, 2, 3, 4, 5, 6, 9 and 10) were collected from Woodbridge Creek, three (SW-7, 8 and 11) from Spa Spring Creek, and six (SW-13, 14, 14d, 15, 16 and 17) from the Arthur Kill (Figure 9-9). Lancaster Laboratories analyzed the samples for TCL VOCs, TCL SVOCs, total TAL metals, dissolved TAL metals, total hardness (as CaCO<sub>3</sub>), TSS, turbidity, chlorides, nitrate, nitrite, TKN, ammonia and sulfate. The analytical results are presented on Tables 9-12 through 9-15 (presented at the end of this section) and Figure 9-9.

The surface water data were screened against the aquatic life protection criteria in NJDEP's Surface Water Quality Standards (SWQS) and the surface water criteria adopted by USEPA that are applicable in New Jersey, pursuant to the NJDEP's February 28, 2003 SWQS *Criteria for Toxic Pollutants Currently Applicable to New Jersey Surface Waters* memorandum. In addition, aquatic life protection criteria published in 1999 by the United States National Oceanic and Atmospheric Administration (NOAA) was used as ecological benchmarks when there were no SWQS or criteria published by USEPA or NJDEP.

The maximum values for contaminants detected above SWQC in the surface water samples are provided in Table 9-16 below, with the respective acute and chronic criteria, and frequency of detection above the SWQC.

**Table 9-16. Maximum Surface Water Concentrations**

Parameter ( $\mu\text{g/L}$ )	Maximum Concentration	SWQC		No. Samples > SWQC Per No. Samples
		Acute	Chronic	
<b>Metals</b>				
Mercury (unfiltered)	0.096	1.8	0.025	1/17
Nickel (filtered)	52.2	8.2	74	9/17
Zinc (filtered)	125	90	81	2/17

Of all the parameters analyzed in surface water samples obtained from the Arthur Kill and adjacent creeks, only three TAL metals were detected above the SWQC. Mercury was only detected above the SWQC in one sample (SW-14-C, Arthur Kill), at an estimated concentration of 0.096  $\mu\text{g/L}$ . Nickel and zinc were detected in background surface water sample locations, as well as locations adjacent to the Refinery.

Based on a comparison of these data to the site soil and groundwater data, the only site-related constituent detected above the SWQC in the surface water samples is nickel, detected above the SWQC in 55 percent of the surface water samples. However, the highest nickel concentration (52.2  $\mu\text{g/L}$ ) was found in the Woodbridge Creek background sample location (SW-10-C).

Mercury and zinc are not present in on-site groundwater above the RFI Delineation Criteria, and were only detected in on-site soils at very low detection frequencies (see Section 9.3.3). Also, these two metals exhibit low frequencies of detection above the respective criteria in soil, groundwater, and surface water.

### 9.3.6 Conclusions

Based on the analytical results described above for the groundwater data and data from the sediments and surface water samples obtained from the adjacent creeks, the COPECs identified as potentially site-related include benzene, xylenes, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, arsenic, lead, nickel and antimony in sediment and nickel in surface water.

A brief discussion regarding the presence of these elements in sediments and surface water adjacent to the site is provided below. However, all of the hazardous substances listed here will be retained as COPECs for the BEE and included in the final BEE conclusions in Section 9.5.

#### 9.3.6.1 Sediment

##### VOC Summary

Based on a comparison of the existing sediment data and the NJDEP's most current, stringent SSGs:

- Benzene and xylenes are COPECs in sediment, present at concentrations above the SSGs.
- VOCs are only found above SSGs in Woodbridge Creek sediments.
- VOCs exhibit a low frequency of detection above the SSG (five of 42 sediment samples).
- Sediment sample locations containing elevated VOCs generally coincide with sample locations containing elevated SVOCs.
- VOCs in sediments are not causing a contravention of the SWQC, based on the VOC surface water results.

##### SVOC Summary

- The SVOCs benzo(a)anthracene, benzo(a)pyrene and benzo(b)fluoranthene are COPECs in sediment, present at concentrations above the SSGs.
- Elevated SVOCs were found in more than 50 percent of the samples in all of the water bodies tested, including background locations.
- The distribution of SVOCs in the sediments likely represents the contribution of these substances from various sources, including off-site areas.
- The elevated SVOC concentrations in the surface water sediments are likely associated with historical contributions from many sources, rather than recent discharges.

- The presence of SVOCs in the sediment is not causing a contravention of the SWQC in the water column, based on the surface water analytical results.

In addition to analytical results, staining and/or petroleum odors were observed in several potential background locations in Woodbridge Creek sediment samples obtained from sampling transects SED-09 and SED-10 (see Vibracore Logs in Appendix D).

## Metals Summary

Antimony is present at concentrations moderately above the ER-L, and well below the ER-M, in only six of the 42 sediment samples. Although only slightly elevated in sediment, these concentrations are approximately one order of magnitude below the concentrations of dissolved antimony in the site groundwater. In addition, antimony exhibits a very low detection frequency above the criterion, based on the site soil data.

Arsenic was detected in sediments at concentrations above the ER-L in 35 of 42 sediment samples. Only three of the 35 samples contained arsenic above the ER-M. Arsenic was also detected at elevated concentrations in background samples, and is present at a moderately high detection frequency in soil and groundwater. However, the source of arsenic is unknown, and it is potentially present due to regional, off-site sources that were historically present near the Refinery.

Cadmium was detected at concentrations moderately above the ER-L, and below the ER-M, in 31 of the 42 sediment samples. An elevated concentration of cadmium was detected in background sample SED-16-C (5.9 mg/kg). In addition, cadmium is not a COC in on-site soils and ground water. Therefore, off-site sources of cadmium are likely contributing to the elevated levels of cadmium in the sediment.

Chromium was detected at concentrations moderately above the ER-L, and well below the ER-M, in 15 of the 42 sediment samples. The highest chromium concentration was detected in background sample SED-16-C (198 mg/kg). In addition, chromium was not detected in the most recent site groundwater data. Therefore, off-site sources of chromium are likely contributing to the elevated levels of chromium in the sediment.

Copper is generally present in sediments at between one and two orders of magnitude over the ER-L, and slightly over the ER-M. Two sample locations (SED-03 and SED-05) exhibit anomalously high concentrations of copper. However, the detection frequency of copper concentrations above the soil criterion is low (3 percent), and copper is not detected above the criterion in on-site groundwater. Also, background sediments exhibit copper concentrations above the ER-L and ER-M.

Lead was detected at concentrations moderately above the ER-L in 34 of the 42 samples, and moderately above the ER-M in 12 of the 42 sediment samples. These concentrations are approximately one order of magnitude above the dissolved lead concentrations in the most

recent on-site groundwater data. However, lead appears to be contributed from background sources, due to the presence of elevated concentrations of lead in upstream samples.

Mercury was detected at concentrations moderately above the ER-L in 11 of the 46 samples, and moderately above the ER-M in 22 of the 46 sediment samples. The highest mercury concentration was detected in background sample SED-16-C (7 mg/kg). In addition, mercury was not detected in the most recent on-site groundwater data. Therefore, off-site sources of mercury are likely contributing to the elevated levels of mercury in the sediment.

Nickel was detected above the ER-L in 41 of 42 sediment samples, and over the ER-M in nearly 50 percent of the samples. However, nickel appears to be related to background conditions, since the highest concentrations of this metal are in upstream samples.

Zinc was detected at concentrations above the ER-L in 35 of the 42 samples, and moderately above the ER-M in 15 of the 42 sediment samples. In contrast, zinc was not identified in the groundwater above the criterion, and the detection frequency for zinc in soil above the criterion is very low. In addition, zinc is present at elevated concentrations in upstream sediment samples.

### **9.3.6.2 Surface Water**

For the most part, COPECs in the sediment are not contributing to the elevated concentrations in the surface water. Based on a comparison of existing surface water data and the SWQC (Section 9.3), mercury, nickel and zinc are within one order of magnitude of the chronic SWQC.

Mercury was detected at a very low concentration (below the MDL) at slightly above the SWQC in only one of 17 samples, which was obtained from the Arthur Kill. Mercury was not detected in a duplicate sample collected at the same location. In addition, mercury was not detected in the most recent groundwater data, and has not been identified as a site-specific contaminant.

Nickel was detected in nine of the 17 surface water samples above the SWQC. The highest concentration of nickel detected in surface water was in background sample SW-10-C. Nickel was also detected at one order of magnitude lower than nickel concentrations in the most recent groundwater data.

Zinc was detected above the SWQC in only two of 17 surface water samples. In addition, zinc is not present above the criterion in on-site groundwater, and exhibits a very low detection frequency above the criterion in on-site soils.

## **9.4 Potential Migration Pathways**

The BEE inspection described in Section 9.2 included a review of migration pathways to the on-site environmentally sensitive areas, including the Arthur Kill, Spa Spring Creek,

Woodbridge Creek and associated wetlands. Potential migration pathways generally include stormwater runoff from overland flow, discharge of shallow groundwater to surface water, and direct discharge of contaminants via spills or pipe outfalls.

#### **9.4.1 Stormwater Pathways**

Stormwater runoff from the Refinery is controlled by a network of catch basins and storm sewer piping, and generally flows into the OWSS. The OWSS connects to the ETP that discharges treated effluent to Woodbridge Creek. The discharge is regulated under an NJPDES-DSW permit. As a result, only very little incidental precipitation that falls along the banks of the adjacent water bodies and stream corridors actually reaches the surface water. The SWMUs and AOCs identified in Section 9.3.1 are adjacent to the surface water bodies to the north and east of the site. Based on the site inspection (Section 9.2), there are no significant stormwater discharge pathways from the on-site SWMUs and AOCs to the adjacent surface water bodies.

#### **Groundwater Pathways**

The migration of contaminants via groundwater was evaluated as a potential pathway for the migration of constituents detected in groundwater samples above the GWQS at the site. Although there were some hits of SVOCs and metals in the groundwater on-site, these constituents are generally immobile in groundwater. The groundwater did contain low to moderate concentrations of BTEX in a few places, but not close to the surface water bodies. Based on a review of the COPECs provided in Section 9.3 and the groundwater quality in the sentinel groundwater monitoring wells located along the creek banks, COPECs are not migrating to the creeks or to the Arthur Kill in groundwater.

#### **9.4.2 Direct Discharge Pathway**

Based on the BEE inspection, review of the file information and discussions with site personnel, there is one direct discharge to Woodbridge Creek from the ETP.

#### **9.4.3 Potential Off-Site Sources**

Both creeks are tidally influenced by the Arthur Kill, which has been impacted by numerous contaminant sources from surrounding industrial land use, roadway runoff and extensive, historical development (see Section 9.1.1). In addition, there is a significant potential for past and current atmospheric deposition of the contaminant found in the sediment and surface water related to the surrounding heavy industry and roadway traffic. These sources likely account for, or contribute to, the presence of elevated concentrations of chemical constituents detected in the creek sediments and surface water adjacent to the site.

## 9.5 BEE Summary Conclusions and Recommendations

### 9.5.1 Environmentally Sensitive Areas

As a result of the site inspection, and a review of the available wetlands maps and NJDEP's GIS data, the environmentally sensitive areas on or adjacent to the site include the Arthur Kill, Spa Spring Creek, Woodbridge Creek and associated wetlands areas located along the north, east and west site boundaries. There are no endangered/threatened species associated with the site and no observed impacts in the identified environmentally sensitive areas. Based on the BEE site inspection, the general conditions of the Kill, creeks and associated wetland areas appear to be similar to other estuarine surface water and wetland areas that are located in older, heavily industrial areas.

### 9.5.2 Contaminants of Potential Ecological Concern

Based on a review of the existing soil, groundwater, sediment and surface water analytical data, the COPECs at the Project site include benzene, xylenes, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, arsenic, lead and nickel in sediment, and nickel in surface water.

VOCs were detected in sediments at a relatively low detection frequency and at low concentrations that coincide with sediments exhibiting elevated SVOC concentrations. SVOCs were detected in most of the sediment samples, including background locations, at concentrations above the SSGs.

All of the metals identified as COPECs were detected above their respective SSGs in background samples collected from the Arthur Kill and Woodbridge Creek.

Based on the surface water analytical results, COPECs detected at elevated concentrations in the sediment samples generally do not appear to be partitioning to the water column.

### 9.5.3 Migration Pathways

Potential migration pathways were evaluated including the potential for stormwater discharges from overland flow, groundwater discharges to surface water, direct discharge of contaminants, and potential off-site sources. Based on this review, groundwater migration along the site perimeter and surface water runoff exhibit a low potential as migration pathways to the adjacent tidal creeks and wetland areas from Chevron. Also, groundwater migration and surface water runoff from off-site industrial properties and roadway runoff likely contribute contaminants to the adjacent tidal creeks and wetland areas.

#### 9.5.4 Conclusions and Recommendations

Environmentally sensitive natural resources exist adjacent to the site, including Spa Spring Creek, Woodbridge Creek, Arthur Kill and associated wetlands and transition areas; however, environmentally sensitive areas are not present on site.

COPECs including VOCs, SVOCs and metals are present at the site in soil and groundwater at concentrations elevated above the RFI Delineation Criteria. Moderately high concentrations of SVOCs and metals were detected above SSGs in sediment samples collected from all three water bodies adjacent to the site. Nickel, mercury and zinc were detected above the SWQC in relatively few surface water sample locations at low concentrations.

Pathways for contaminant migration from SWMUs and AOCs to environmentally sensitive natural resources do not appear to be complete. All contaminated soil and groundwater areas adjacent to the property boundaries along Woodbridge Creek, Spa Spring Creek and the Arthur Kill have been delineated and do not extend to the environmentally sensitive areas.

There is no indication of ongoing discharges of hazardous substances from the site based on the soil and groundwater sample analysis, and LNAPL investigation.

Many area-wide, off-site, background sources are likely contributors to the presence of elevated concentrations of VOCs, SVOCs and metals in sediments, and to the slightly elevated metal concentrations in surface water. Staining and/or petroleum odors were also observed in several potential background locations in Woodbridge Creek sediment samples obtained from sampling transects SED-09 and SED-10 (see Vibracore Logs in Appendix D).

Based on the BEE, further evaluation of SVOCs and metal COPECs in the Woodbridge Creek sediments is recommended.

## **Sediment Sample Tables 9-7 — 9-11**

**Table 9-7**  
**Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-11-C/6-12 SED-08-A/6-12      SED-08-C/6-12 SED-07-A/6-12 SED-07-B/6-12 SED-07-C/6-12 SED-10-A/6-12 SED-10-B/6-12 SED-10-C/6-12  
 Date Sampled: 12/20/02 12/20/02 12/20/02 12/20/02 12/20/02 12/20/02 12/19/02 12/19/02 12/19/02  
 Lab Sample No.: 3967898 3967902 3967884 3967896 3967858 3967900 3967870 3967872 3967861  
 Laboratory: Lancaster Lancaster Lancaster Lancaster Lancaster Lancaster Lancaster Lancaster Lancaster

VOCs (ppm)	Abbrev.	SSG <sup>(1)</sup>	Flow Direction	Spa Spring Creek						Woodbridge Creek		
Methyl t-butyl ether	MTBE	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Chloromethane	CM	(--)	0.69 U	1.2 U	0.68 U	0.86 U	1.5 U	1.9 U	0.32 U	0.31 U	0.38 U	U
Vinyl Chloride	VC	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Bromomethane	BM	(--)	0.69 U	1.2 U	0.68 U	0.86 U	1.5 U	1.9 U	0.32 U	0.31 U	0.38 U	U
Chloroethane	CE	(--)	0.69 U	1.2 U	0.68 U	0.86 U	1.5 U	1.9 U	0.32 U	0.31 U	0.38 U	U
1,1-Dichloroethene	1,1-DCE	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Methylene Chloride	MC	(--)	0.69 U	1.2 U	0.68 U	0.86 U	1.5 U	1.9 U	0.32 U	0.31 U	0.38 U	U
trans-1,2-Dichloroethene	t-1,2-DCE	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
1,1-Dichloroethane	1,1-DCA	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
cis-1,2-Dichloroethene	c-1,2-DCE	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Chloroform	Chloroform	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
1,1,1-Trichloroethane	1,1,1-TCA	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Carbon Tetrachloride	CT	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Benzene	Benzene	0.34	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
1,2-Dichloroethane	1,2-DCA	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Trichloroethene	TCE	1.6	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
1,2-Dichloropropane	1,2-DCP	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Bromodichloromethane	BDCM	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Toluene	Toluene	2.5	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
1,1,2-Trichloroethane	1,1,2-TCA	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Tetrachloroethene	PCE	0.45	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Dibromochloromethane	DBCM	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Chlorobenzene	CB	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Ethylbenzene	EB	1.4	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Styrene	Styrene	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Bromoform	Bromoform	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
1,1,2,2-Tetrachloroethane	1,1,2,2-PCA	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Acetone	Acetone	(--)	2.4 U	4.1 U	2.4 U	3 U	5.2 U	6.7 U	1.1 U	1.1 U	1.3 U	U
Carbon Disulfide	CDS	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
2-Butanone	MEK	(--)	1.4 U	2.4 U	1.4 U	1.7 U	3 U	3.8 U	0.64 U	0.62 U	0.77 U	U
trans-1,3-Dichloropropene	t-1,3-DCP	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
cis-1,3-Dichloropropene	c-1,3-DCP	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
4-Methyl-2-pentanone	MBK	(--)	1 U	1.8 U	1 U	1.3 U	2.2 U	2.9 U	0.48 U	0.46 U	0.57 U	U
2-Hexanone	2-Hex	(--)	1 U	1.8 U	1 U	1.3 U	2.2 U	2.9 U	0.48 U	0.46 U	0.57 U	U
Xylene (Total)	Xylene	>0.12	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Cyclohexane	CH	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Methyl Acetate	MA	(--)	0.69 U	1.2 U	0.68 U	0.94 J	1.5 U	1.9 U	0.32 U	0.31 U	0.41 J	J
Methylcyclohexane	MCH	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.27 J	J
Dichlorodifluoromethane	DCDFM	(--)	0.69 U	1.2 U	0.68 U	0.86 U	1.5 U	1.9 U	0.32 U	0.31 U	0.38 U	U
Trichlorodifluoromethane	TCFM	(--)	0.69 U	1.2 U	0.68 U	0.86 U	1.5 U	1.9 U	0.32 U	0.31 U	0.38 U	U
1,2-Dibromoethane	1,2 DBE	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Isopropylbenzene	IPB	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
1,3-Dichlorobenzene	1,3-DCB	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
1,4-Dichlorobenzene	1,4-DCB	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
1,2-Dichlorobenzene	1,2-DCB	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
1,2-Dibromo-3-chloropropane	1,2-DB-3-CP	(--)	0.69 U	1.2 U	0.68 U	0.86 U	1.5 U	1.9 U	0.32 U	0.31 U	0.38 U	U
1,2,4-Trichlorobenzene	1,2,4-TCB	(--)	0.35 U	0.59 U	0.34 U	0.43 U	0.73 U	1 U	0.16 U	0.15 U	0.19 U	U
Freon 113	Freon113	(--)	0.69 U	1.2 U	0.68 U	0.86 U	1.5 U	1.9 U	0.32 U	0.31 U	0.38 U	U
Total Targeted VOCs			ND	ND	ND	0.94	ND	ND	ND	ND	ND	0.68
Total TICs			ND	ND	ND	ND	ND	ND	12.16	ND	ND	14.2
Total VOCs			ND	ND	ND	0.94	ND	ND	12.16	ND	ND	14.88

U = The compound was not detected at the indicated concentration; J = Estimated value; ND = not detected.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent the Volatile Organic Sediment Screening Guidelines (SSG) in Table 3 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations (GSQE).

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's GSQE.

Bold and shaded indicates concentration above the SSG.

ppm = parts per million.

**Table 9-7**  
**Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-09-A/6-12    SED-09-B/6-12    SED-09-C/6-12    SED-09-C/33-39    SED-06-A/6-12    SED-06-B/6-12    SED-06-C/6-12    SED-05-A/6-12    SED-05-B/6-12  
 Date Sampled: 12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02  
 Lab Sample No.: 3967876    3967868    3967863    3967865    3967874    3967878    3967866    3967906    3967908  
 Laboratory: Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster

VOCs (ppm)	Abbrev.	SSG <sup>(1)</sup>	Woodbridge Creek																	
Methyl t-butyl ether	MTBE	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Chloromethane	CM	(--)	0.57	U	0.39	U	0.78	U	0.61	U	0.28	U	0.64	U	0.38	U	0.46	U	0.26	U
Vinyl Chloride	VC	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Bromomethane	BM	(--)	0.57	U	0.39	U	0.78	U	0.61	U	0.28	U	0.64	U	0.38	U	0.46	U	0.26	U
Chloroethane	CE	(--)	0.57	U	0.39	U	0.78	U	0.61	U	0.28	U	0.64	U	0.38	U	0.46	U	0.26	U
1,1-Dichloroethene	1,1-DCE	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Methylene Chloride	MC	(--)	0.57	U	0.39	U	0.78	U	0.61	U	0.28	U	0.64	U	0.38	U	0.46	U	0.26	U
trans-1,2-Dichloroethene	t-1,2-DCE	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
1,1-Dichloroethane	1,1-DCA	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
cis-1,2-Dichloroethene	c-1,2-DCE	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Chloroform	Chloroform	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
1,1,1-Trichloroethane	1,1,1-TCA	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Carbon Tetrachloride	CT	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Benzene	Benzene	0.34	0.29	U	0.2	U	0.39	U	3		0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
1,2-Dichloroethane	1,2-DCA	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Trichloroethene	TCE	1.6	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
1,2-Dichloropropane	1,2-DCP	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Bromodichloromethane	BDCM	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Toluene	Toluene	2.5	0.29	U	0.2	U	0.39	U	1.1	J	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
1,1,2-Trichloroethane	1,1,2-TCA	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Tetrachloroethene	PCE	0.45	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Dibromochloromethane	DBCM	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Chlorobenzene	CB	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Ethylbenzene	EB	1.4	0.29	U	0.2	U	0.39	U	6.6		0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Styrene	Styrene	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Bromoform	Bromoform	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
1,1,2,2-Tetrachloroethane	1,1,2,2-PCA	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Acetone	Acetone	(--)	2	U	1.4	U	2.7	U	2.1	U	1	U	2.2	U	1.3	U	1.6	U	0.92	U
Carbon Disulfide	CDS	(--)	0.29	U	0.75	J	0.39	U	3.3		0.14	U	4		1.6		0.23	U	0.13	U
2-Butanone	MEK	(--)	1.1	U	0.79	U	1.6	U	1.2	U	0.57	U	1.3	U	0.76	U	0.91	U	0.53	U
trans-1,3-Dichloropropene	t-1,3-DCP	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
cis-1,3-Dichloropropene	c-1,3-DCP	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
4-Methyl-2-pentanone	MBK	(--)	0.86	U	0.59	U	1.2	U	0.91	U	0.43	U	1	U	0.57	U	0.68	U	0.39	U
2-Hexanone	2-Hex	(--)	0.86	U	0.59	U	1.2	U	0.91	U	0.43	U	1	U	0.57	U	0.68	U	0.39	U
Xylene (Total)	Xylene	>0.12	0.29	U	0.2	U	0.39	U	29		0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Cyclohexane	CH	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Methyl Acetate	MA	(--)	0.57	U	0.54	J	4.9		0.61	U	0.28	U	0.72	J	0.53	J	1	J	0.26	U
Methylcyclohexane	MCH	(--)	0.32	J	0.2	U	0.39	U	81		0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Dichlorodifluoromethane	DCDFM	(--)	0.57	U	0.39	U	0.78	U	0.61	U	0.28	U	0.64	U	0.38	U	0.46	U	0.26	U
Trichlorofluoromethane	TCFM	(--)	0.57	U	0.39	U	0.78	U	0.61	U	0.28	U	0.64	U	0.38	U	0.46	U	0.26	U
1,2-Dibromoethane	1,2 DBE	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Isopropylbenzene	IPB	(--)	0.29	U	0.2	U	0.39	U	1.6		0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
1,3-Dichlorobenzene	1,3-DCB	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
1,4-Dichlorobenzene	1,4-DCB	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
1,2-Dichlorobenzene	1,2-DCB	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
1,2-Dibromo-3-chloropropane	1,2-DB 3-CP	(--)	0.57	U	0.39	U	0.78	U	0.61	U	0.28	U	0.64	U	0.38	U	0.46	U	0.26	U
1,2,4-Trichlorobenzene	1,2,4-TCB	(--)	0.29	U	0.2	U	0.39	U	0.3	U	0.14	U	0.32	U	0.19	U	0.23	U	0.13	U
Freon 113	Freon113	(--)	0.57	U	0.39	U	0.78	U	0.61	U	0.28	U	0.64	U	0.38	U	0.46	U	0.26	U
Total Targeted VOCs			0.32		1.29		4.9		125.6		ND		4.72		2.13		1		ND	
Total TICs			11.2		14.6		9.8		796		ND		85.9		ND		16.3		8.13	
Total VOCs			11.52		15.89		14.7		921.6		ND		90.62		2.13		17.3		8.13	

U = The compound was not detected at the indicated concentration; J = Estimated value; ND = not detected.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent the Volatile Organic Sediment Screening Guidelines (SSG) in Table 3 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations (GSQE).

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's GSQE.

Bold and shaded indicates concentration above the SSG.

ppm = parts per million.

**Table 9-7**  
**Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-05-C/6-12 SED-04-A/6-12      SED-04-A/39-45 SED-04-B/6-12 SED-04-C/6-12 SED-03-A/6-12 SED-03-B/6-12 SED-03-C/6-12 SED-03-C/12-18  
 Date Sampled: 12/19/02 12/19/02      12/19/02 12/19/02 12/19/02 12/19/02 12/19/02 12/19/02 12/19/02  
 Lab Sample No.: 3967854 3967910      3967912&13 3967914 3967916 3967918 3967856 3967920 3967922  
 Laboratory: Lancaster Lancaster      Lancaster Lancaster Lancaster Lancaster Lancaster Lancaster Lancaster

VOCS (ppm)	Abbrev.	SSG <sup>(1)</sup>	Woodbridge Creek															
Methyl t-butyl ether	MTBE	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.21	U	0.4	U
Chloromethane	CM	(--)	0.8	U	0.49	U	0.39	U	0.31	U	0.59	U	0.48	U	0.43	U	0.8	U
Vinyl Chloride	VC	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.21	U	0.4	U
Bromomethane	BM	(--)	0.8	U	0.49	U	0.39	U	0.31	U	0.59	U	0.48	U	0.48	U	0.43	U
Chloroethane	CE	(--)	0.8	U	0.49	U	0.39	U	0.31	U	0.59	U	0.48	U	0.48	U	0.43	U
1,1-Dichloroethene	1,1-DCE	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Methylene Chloride	MC	(--)	0.8	U	0.49	U	0.39	U	0.31	U	0.59	U	0.48	U	0.48	U	0.43	U
trans-1,2-Dichloroethene	t-1,2-DCE	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
1,1-Dichloroethane	1,1-DCA	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
cis-1,2-Dichloroethene	c-1,2-DCE	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Chloroform	Chloroform	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
1,1,1-Trichloroethane	1,1,1-TCA	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Carbon Tetrachloride	CT	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Benzene	Benzene	0.34	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	<b>3.4</b>	<b>20</b>
1,2-Dichloroethane	1,2-DCA	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Trichloroethene	TCE	1.6	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
1,2-Dichloropropane	1,2-DCP	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Bromodichloromethane	BDCM	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Toluene	Toluene	2.5	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	J
1,1,2-Trichloroethane	1,1,2-TCA	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Tetrachloroethene	PCE	0.45	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Dibromochloromethane	DBCM	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Chlorobenzene	CB	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Ethylbenzene	EB	1.4	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	1.1	<b>5.5</b>
Styrene	Styrene	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Bromoform	Bromoform	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
1,1,2,2-Tetrachloroethane	1,1,2,2-PCA	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Acetone	Acetone	(--)	2.8	U	1.7	U	1.4	U	1.1	U	2.1	U	1.7	U	1.7	U	1.5	2.8
Carbon Disulfide	CDS	(--)	2.5		0.24	U	0.2	U	0.15	U	0.29	U	1.8		0.24	U	0.44	J
2-Butanone	MEK	(--)	1.6	U	1	U	0.78	U	0.61	U	1.2	U	1	U	1	U	0.85	U
trans-1,3-Dichloropropene	t-1,3-DCP	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
cis-1,3-Dichloropropene	c-1,3-DCP	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
4-Methyl-2-pentanone	MBK	(--)	1.2	U	0.73	U	0.59	U	0.46	U	0.88	U	0.71	U	0.72	U	0.64	U
2-Hexanone	2-Hex	(--)	1.2	U	0.73	U	0.59	U	0.46	U	0.88	U	0.71	U	0.72	U	0.64	U
Xylene (Total)	Xylene	>0.12	0.4	U	0.24	U	<b>3</b>		0.15	U	0.29	U	0.24	U	0.24	U	<b>3.6</b>	<b>26</b>
Cyclohexane	CH	(--)	0.4	U	0.24	U	1.3		0.15	U	0.29	U	0.24	U	0.24	U	3.4	24
Methyl Acetate	MA	(--)	1.4	J	0.49	U	0.39	U	1.6		0.59	U	0.48	U	0.54	J	0.43	U
Methylcyclohexane	MCH	(--)	0.4	U	0.24	U	4		0.15	U	0.29	U	0.24	U	0.24	U	33	130
Dichlorodifluoromethane	DCDFM	(--)	0.8	U	0.49	U	0.39	U	0.31	U	0.59	U	0.48	U	0.48	U	0.43	U
Trichlorofluoromethane	TCFM	(--)	0.8	U	0.49	U	0.39	U	0.31	U	0.59	U	0.48	U	0.48	U	0.43	U
1,2-Dibromoethane	1,2 DBE	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Isopropylbenzene	IPB	(--)	0.4	U	0.24	U	0.33	J	0.15	U	0.29	U	0.26	J	0.24	U	0.89	J
1,3-Dichlorobenzene	1,3-DCB	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
1,4-Dichlorobenzene	1,4-DCB	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
1,2-Dichlorobenzene	1,2-DCB	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
1,2-Dibromo-3-chloropropane	1,2-DB 3-CP	(--)	0.8	U	0.49	U	0.39	U	0.31	U	0.59	U	0.48	U	0.48	U	0.43	U
1,2,4-Trichlorobenzene	1,2,4-TCB	(--)	0.4	U	0.24	U	0.2	U	0.15	U	0.29	U	0.24	U	0.24	U	0.21	U
Freon 113	Freon113	(--)	0.8	U	0.49	U	0.39	U	0.31	U	0.59	U	0.48	U	0.48	U	0.43	U
Total Targeted VOCs			3.9		ND	8.63		1.6		ND	2.06		0.54		59.21		211.72	
Total TICs			9		4	88.8		0.78		ND	337		ND		191		763	
Total VOCs			12.9		4	97.43		2.38		ND	339.06		0.54		250.21		974.72	

U = The compound was not detected at the indicated concentration; J = Estimated value; ND = not detected.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent the Volatile Organic Sediment Screening Guidelines (SSG) in Table 3 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations (GSQE).

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's GSQE.

Bold and shaded indicates concentration above the SSG.

ppm = parts per million.

**Table 9-7**  
**Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-03-C/30-36 SED-02-A/6-12      SED-02-B/6-12      SED-02-B/6-12C SED-02-C/6-12      SED-01-A/6-12      SED-01-B/6-12      SED-01-C/6-12      SED-16-C/6-12  
 Date Sampled: 12/19/02      12/20/02      12/20/02      12/20/02      12/20/02      12/20/02      12/20/02      12/20/02  
 Lab Sample No.: 3967923      3967891      3967887      3967888      3967893      3967880      3967882      3967904  
 Laboratory: Lancaster      Lancaster      Lancaster      Lancaster      Lancaster      Lancaster      Lancaster      Lancaster

VOCs (ppm)	Abbrev.	SSG <sup>(1)</sup>	Woodbridge Creek			⇒			⇒			⇒			Arthur Kill					
Methyl t-butyl ether	MTBE	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Chloromethane	CM	(--)	0.88	U	1.4	U	0.31	U	1	U	0.63	U	0.38	U	0.55	U	0.62	U	0.91	U
Vinyl Chloride	VC	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Bromomethane	BM	(--)	0.88	U	1.4	U	0.31	U	1	U	0.63	U	0.38	U	0.55	U	0.62	U	0.91	U
Chloroethane	CE	(--)	0.88	U	1.4	U	0.31	U	1	U	0.63	U	0.38	U	0.55	U	0.62	U	0.91	U
1,1-Dichloroethene	1,1-DCE	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Methylene Chloride	MC	(--)	0.88	U	1.4	U	0.31	U	1	U	0.63	U	0.38	U	0.55	U	0.62	U	0.91	U
trans-1,2-Dichloroethene	t-1,2-DCE	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
1,1-Dichloroethane	1,1-DCA	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
cis-1,2-Dichloroethene	c-1,2-DCE	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Chloroform	Chloroform	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
1,1,1-Trichloroethane	1,1,1-TCA	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Carbon Tetrachloride	CT	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Benzene	Benzene	0.34	<b>15</b>		0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
1,2-Dichloroethane	1,2-DCA	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Trichloroethene	TCE	1.6	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
1,2-Dichloropropane	1,2-DCP	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Bromodichloromethane	BDCM	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Toluene	Toluene	2.5	<b>2.9</b>		0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
1,1,2-Trichloroethane	1,1,2-TCA	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Tetrachloroethene	PCE	0.45	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Dibromochloromethane	DBCM	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Chlorobenzene	CB	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Ethylbenzene	EB	1.4	<b>3.9</b>		0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Styrene	Styrene	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Bromoform	Bromoform	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
1,1,2,2-Tetrachloroethane	1,1,2,2-PCA	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Acetone	Acetone	(--)	3.1	U	4.9	U	1.1	U	3.4	U	2.2	U	1.3	U	1.9	U	2.2	U	3.2	U
Carbon Disulfide	CDS	(--)	1.1	J	0.71	U	0.15	U	0.48	U	1.5	J	0.19	U	0.71	J	6.1		1.2	J
2-Butanone	MEK	(--)	1.8	U	2.8	U	0.61	U	1.9	U	1.3	U	0.76	U	1.1	U	1.2	U	1.8	U
trans-1,3-Dichloropropene	t-1,3-DCP	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
cis-1,3-Dichloropropene	c-1,3-DCP	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
4-Methyl-2-pentanone	MBK	(--)	1.3	U	2.1	U	0.46	U	1.4	U	0.94	U	0.57	U	0.83	U	0.92	U	1.4	U
2-Hexanone	2-Hex	(--)	1.3	U	2.1	U	0.46	U	1.4	U	0.94	U	0.57	U	0.83	U	0.92	U	1.4	U
Xylene (Total)	Xylene	>0.12	<b>27</b>		0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Cyclohexane	CH	(--)	8.4		0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Methyl Acetate	MA	(--)	1.2	J	1.7	J	1.1		1	U	0.63	U	0.38	U	0.55	U	0.62	U	1.1	J
Methylcyclohexane	MCH	(--)	33		0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.34	J	0.31	U	0.46	U
Dichlorodifluoromethane	DCDFM	(--)	0.88	U	1.4	U	0.31	U	1	U	0.63	U	0.38	U	0.55	U	0.62	U	0.91	U
Trichlorofluoromethane	TCFM	(--)	0.88	U	1.4	U	0.31	U	1	U	0.63	U	0.38	U	0.55	U	0.62	U	0.91	U
1,2-Dibromoethane	1,2 DBE	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
Isopropylbenzene	IPB	(--)	1.9	J	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
1,3-Dichlorobenzene	1,3-DCB	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
1,4-Dichlorobenzene	1,4-DCB	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
1,2-Dichlorobenzene	1,2-DCB	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.19	U	0.28	U	0.31	U	0.46	U
1,2-Dibromo-3-chloropropane	1,2-DB 3-CP	(--)	0.88	U	1.4	U	0.31	U	1	U	0.63	U	0.38	U	0.55	U	0.62	U	0.91	U
1,2,4-Trichlorobenzene	1,2,4-TCB	(--)	0.44	U	0.71	U	0.15	U	0.48	U	0.31	U	0.21	J	0.28	U	0.31	U	0.46	U
Freon 113	Freon113	(--)	0.88	U	1.4	U	0.31	U	1	U	0.63	U	0.38	U	0.55	U	0.62	U	0.91	U
Total Targeted VOCs			94.4		1.7		1.1		ND		1.5		0.21		1.05		6.1		2.3	
Total TICs			1002		60.6		4.5		ND		86.7		65.7		50.2		83.3		10.8	
Total VOCs			1096.4		62.3		5.6		ND		88.2		65.91		51.25		89.4		13.1	

U = The compound was not detected at the indicated concentration; J = Estimated value; ND = not detected.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent the Volatile Organic Sediment Screening Guidelines (SSG) in Table 3 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations (GSQE).

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's GSQE.

Bold and shaded indicates concentration above the SSG.

ppm = parts per million.

**Table 9-7**  
**Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-13-C/6-12 SED-13-C/6-12D SED-14-C/6-12 SED-18-C/6-12 SED-15-C/6-12 SED-17-C/6-12 ME121702 TB121902 FB121902  
 Date Sampled: 12/17/02 12/17/02 12/17/02 12/17/02 12/17/02 12/17/02 12/17/02 12/19/02 12/19/02  
 Lab Sample No.: 3964479&80 3964481&82 3964483&84 3964488 3964477&78 3964486 3964487 3967860 3967924  
 Laboratory: Lancaster Lancaster Lancaster Lancaster Lancaster Lancaster Lancaster Lancaster Lancaster

VOCs (ppm)	Abbrev.	SSG <sup>(1)</sup>	Arthur Kill			↔			↔			↔			Trip Blanks (ppb)	Field Blank (ppb)				
Methyl t-butyl ether	MTBE	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	0.5	U
Chloromethane	CM	(--)	0.75	U	0.69	U	0.77	U	0.68	U	1	U	0.39	U	0.25	U	0.25	U	1	U
Vinyl Chloride	VC	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
Bromomethane	BM	(--)	0.75	U	0.69	U	0.77	U	0.68	U	1	U	0.39	U	0.25	U	0.25	U	1	U
Chloroethane	CE	(--)	0.75	U	0.69	U	0.77	U	0.68	U	1	U	0.39	U	0.25	U	0.25	U	1	U
1,1-Dichloroethene	1,1-DCE	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	0.8	U
Methylene Chloride	MC	(--)	0.75	U	0.69	U	0.77	U	0.68	U	1	U	0.39	U	0.25	U	0.25	U	2	U
trans-1,2-Dichloroethene	t-1,2-DCE	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	0.8	U
1,1-Dichloroethane	1,1-DCA	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
cis-1,2-Dichloroethene	c-1,2-DCE	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	0.8	U
Chloroform	Chloroform	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	0.8	U
1,1,1-Trichloroethane	1,1,1-TCA	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	0.8	U
Carbon Tetrachloride	CT	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
Benzene	Benzene	0.34	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	0.5	U
1,2-Dichloroethane	1,2-DCA	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
Trichloroethene	TCE	1.6	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
1,2-Dichloropropane	1,2-DCP	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
Bromodichloromethane	BDCM	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
Toluene	Toluene	2.5	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	0.7	U
1,1,2-Trichloroethane	1,1,2-TCA	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	0.8	U
Tetrachloroethene	PCE	0.45	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	0.8	U
Dibromochloromethane	DBCM	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
Chlorobenzene	CB	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	0.8	U
Ethylbenzene	EB	1.4	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	0.8	U
Styrene	Styrene	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
Bromoform	Bromoform	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
1,1,2,2-Tetrachloroethane	1,1,2,2-PCA	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
Acetone	Acetone	(--)	2.6	U	2.4	U	2.7	U	2.4	U	3.6	U	1.4	U	0.88	U	0.88	U	6	U
Carbon Disulfide	CDS	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
2-Butanone	MEK	(--)	1.5	U	1.4	U	1.5	U	1.4	U	2	U	0.79	U	0.5	U	0.5	U	3	U
trans-1,3-Dichloropropene	t-1,3-DCP	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
cis-1,3-Dichloropropene	c-1,3-DCP	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
4-Methyl-2-pentanone	MBK	(--)	1.1	U	1	U	1.2	U	1	U	1.5	U	0.59	U	0.38	U	0.38	U	3	U
2-Hexanone	2-Hex	(--)	1.1	U	1	U	1.2	U	1	U	1.5	U	0.59	U	0.38	U	0.38	U	3	U
Xylene (Total)	Xylene	>0.12	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	0.8	U
Cyclohexane	CH	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	2	U
Methyl Acetate	MA	(--)	0.89	J	0.85	J	0.78	J	1.1	J	1.6	J	0.39	U	0.25	U	0.25	U	1	U
Methylcyclohexane	MCH	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
Dichlorodifluoromethane	DCDFM	(--)	0.75	U	0.69	U	0.77	U	0.68	U	1	U	0.39	U	0.25	U	0.25	U	2	U
Trichlorofluoromethane	TCFM	(--)	0.75	U	0.69	U	0.77	U	0.68	U	1	U	0.39	U	0.25	U	0.25	U	2	U
1,2-Dibromoethane	1,2 DBE	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
Isopropylbenzene	IPB	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
1,3-Dichlorobenzene	1,3-DCB	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
1,4-Dichlorobenzene	1,4-DCB	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
1,2-Dichlorobenzene	1,2-DCB	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
1,2-Dibromo-3-chloropropane	1,2-DB-3-CP	(--)	0.75	U	0.69	U	0.77	U	0.68	U	1	U	0.39	U	0.25	U	0.25	U	2	U
1,2,4-Trichlorobenzene	1,2,4-TCB	(--)	0.37	U	0.34	U	0.38	U	0.34	U	0.51	U	0.2	U	0.13	U	0.13	U	1	U
Freon 113	Freon113	(--)	0.75	U	0.69	U	0.77	U	0.68	U	1	U	0.39	U	0.25	U	0.25	U	2	U
Total Targeted VOCs			0.89		0.85		0.78		1.1		1.6		ND		ND		ND		ND	
Total TICs			ND		ND		ND		ND		ND		19.9		ND		ND		ND	
Total VOCs			0.89		0.85		0.78		1.1		1.6		19.9		ND		ND		ND	

U = The compound was not detected at the indicated concentration; J = Estimated value; ND = not detected.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent the Volatile Organic Sediment Screening Guidelines (SSG) in Table 3 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations (GSQE).

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's GSQE.

Bold and shaded indicates concentration above the SSG.

ppm = parts per million.

**Table 9-7**  
**Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): TB122002  
 Date Sampled: 12/20/02  
 Lab Sample No.: 3967886  
 Laboratory: Lancaster

FB122002  
 12/20/02  
 3967895  
 Lancaster

VOCs (ppm)	Abbrev.	SSG <sup>(1)</sup>	Trip Blank	Field Blank (ppb)
Methyl t-butyl ether	MTBE	(--)	0.13	U
Chloromethane	CM	(--)	0.25	U
Vinyl Chloride	VC	(--)	0.13	U
Bromomethane	BM	(--)	0.25	U
Chloroethane	CE	(--)	0.25	U
1,1-Dichloroethene	1,1-DCE	(--)	0.13	U
Methylene Chloride	MC	(--)	0.25	U
trans-1,2-Dichloroethene	t-1,2-DCE	(--)	0.13	U
1,1-Dichloroethane	1,1-DCA	(--)	0.13	U
cis-1,2-Dichloroethene	c-1,2-DCE	(--)	0.13	U
Chloroform	Chloroform	(--)	0.13	U
1,1,1-Trichloroethane	1,1,1-TCA	(--)	0.13	U
Carbon Tetrachloride	CT	(--)	0.13	U
Benzene	Benzene	0.34	0.13	U
1,2-Dichloroethane	1,2-DCA	(--)	0.13	U
Trichloroethene	TCE	1.6	0.13	U
1,2-Dichloropropane	1,2-DCP	(--)	0.13	U
Bromodichloromethane	BDCM	(--)	0.13	U
Toluene	Toluene	2.5	0.13	U
1,1,2-Trichloroethane	1,1,2-TCA	(--)	0.13	U
Tetrachloroethene	PCE	0.45	0.13	U
Dibromochloromethane	DBCM	(--)	0.13	U
Chlorobenzene	CB	(--)	0.13	U
Ethylbenzene	EB	1.4	0.13	U
Styrene	Styrene	(--)	0.13	U
Bromoform	Bromoform	(--)	0.13	U
1,1,2,2-Tetrachloroethane	1,1,2,2-PCA	(--)	0.13	U
Acetone	Acetone	(--)	0.88	U
Carbon Disulfide	CDS	(--)	0.13	U
2-Butanone	MEK	(--)	0.5	U
trans-1,3-Dichloropropene	t-1,3-DCP	(--)	0.13	U
cis-1,3-Dichloropropene	c-1,3-DCP	(--)	0.13	U
4-Methyl-2-pentanone	MBK	(--)	0.38	U
2-Hexanone	2-Hex	(--)	0.38	U
Xylene (Total)	Xylene	>0.12	0.13	U
Cyclohexane	CH	(--)	0.13	U
Methyl Acetate	MA	(--)	0.25	U
Methylcyclohexane	MCH	(--)	0.13	U
Dichlorodifluoromethane	DCDFM	(--)	0.25	U
Trichlorofluoromethane	TCFM	(--)	0.25	U
1,2-Dibromoethane	1,2 DBE	(--)	0.13	U
Isopropylbenzene	IPB	(--)	0.13	U
1,3-Dichlorobenzene	1,3-DCB	(--)	0.13	U
1,4-Dichlorobenzene	1,4-DCB	(--)	0.13	U
1,2-Dichlorobenzene	1,2-DCB	(--)	0.13	U
1,2-Dibromo-3-chloropropane	1,2-DB 3-CP	(--)	0.25	U
1,2,4-Trichlorobenzene	1,2,4-TCB	(--)	0.13	U
Freon 113	Freon113	(--)	0.25	U
Total Targeted VOCs			ND	ND
Total TICs			ND	ND
Total VOCs			ND	ND

U = The compound was not detected at the indicated concentration; J = Estimated value; ND = not detected.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent the Volatile Organic Sediment Screening Guidelines (SSG) in Table 3 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations (GSQE).

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's GSQE.

Bold and shaded indicates concentration above the SSG.

ppm = parts per million.

**Table 9-8**  
**Semi-Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-11-C/0-6    SED-08-A/0-6    SED-08-C/0-6    SED-07-A/0-6    SED-07-B/0-6    SED-07-C/0-6    SED-10-A/0-6    SED-10-B/0-6    SED-10-C/0-6  
 Date Sampled: 12/20/02    12/20/02    12/20/02    12/20/02    12/20/02    12/20/02    12/19/02    12/19/02    12/19/02  
 Lab Sample No.: 3967899    3967903    3967885    3967897    3967859    3967901    3967871    3967873    3967862  
 Laboratory: Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster

SVOCs (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Flow Direction	Spa Spring Creek				Woodbridge Creek												
					↔	↔	↔	↔	↔	↔	↔	↔									
Naphthalene	Naphthalene	0.16	2.1	0.012	U	0.013	J	0.024	U	0.053	0.034	U	0.031	U	0.0018	J	<b>0.22</b>	0.003	J		
2-Methylnaphthalene	2-MNap	0.07	0.67	0.0049	U	0.0071	J	0.015	J	0.057	0.014	U	0.013	U	0.0009	J	<b>0.22</b>	0.0031			
Acenaphthylene	ACPL	<b>0.044</b>	0.64	0.0049	U	0.0024	U	0.015	J	<b>0.083</b>	0.014	U	0.013	U	0.021		0.027	0.0049			
Acenaphthene	ACP	0.016	0.5	0.0049	U	0.005	J	0.011	J	<b>0.017</b>	J	0.014	U	0.013	U	0.0008	J	<b>0.052</b>	<b>0.017</b>		
Fluorene	Fluorene	0.019	0.54	0.0059	J	0.0062	J	0.016	J	<b>0.031</b>	0.014	U	0.013	U	0.0012	J	<b>0.074</b>	0.019			
Phenanthrene	PhA	0.24	1.5	0.011	J	0.032		0.17		<b>0.31</b>	0.018	J	0.025	J	0.011		<b>0.77</b>	0.24			
Anthracene	ANT	<b>0.085</b>	1.1	0.0049	U	0.0071	J	0.043		<b>0.13</b>	0.014	U	0.013	U	0.017		<b>0.19</b>	0.051			
Fluoranthene	Fluoranthene	0.6	5.1	0.022		0.056		0.39		0.5	0.034	J	0.028	J	0.12		<b>1.1</b>	0.4			
Pyrene	Pyrene	<b>0.665</b>	2.6	0.022		0.1		0.35		0.61	0.039	J	0.031	J	0.24		<b>1.4</b>	0.47			
Benzo(a)anthracene	B(a)A	0.261	1.6	0.0097	J	0.018		0.16		<b>0.29</b>	0.014	U	0.013	U	0.14		<b>0.63</b>	0.21			
Chrysene	Chrysene	<b>0.384</b>	2.8	0.011	J	0.036		0.24		<b>0.39</b>	0.02	J	0.017	J	0.14		<b>1</b>	0.24			
Benzo(b)fluoranthene	B(b)F	(-)	(-)	0.012	J	0.042		0.33		0.53	0.025	J	0.02	J	0.21		1.1	0.33			
Benzo(k)fluoranthene	B(k)F	0.24	1340	0.0049	U	0.015	J	0.12		0.18	0.014	U	0.013	U	0.087		<b>0.34</b>	0.1			
Benzo(a)pyrene	B(a)P	0.43	1.6	0.0061	J	0.018		0.22		<b>0.45</b>	0.014	J	0.013	U	0.19		<b>0.65</b>	0.22			
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	0.2	320	0.0058	J	0.019		0.18		<b>0.37</b>	0.014	U	0.014	J	0.095		<b>0.22</b>	0.14			
Dibenz(a,h)anthracene	DB(a,h)a	0.063	0.26	0.0049	U	0.0067	J	0.05		<b>0.15</b>	0.014	U	0.013	U	0.026		<b>0.073</b>	0.036			
Benzo(g,h,i)perylene	B(g,h,i)P	0.17	320	0.0049	U	0.025		<b>0.23</b>		<b>0.74</b>	0.016	J	0.013	U	0.095		<b>0.21</b>	0.17			
Phenol	Phenol	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2-Chlorophenol	2-CP	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
N-Nitroso-di-n-propylamine	NDPA	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
4-Chloro-3-methylphenol	4-C-3-MP	(-)	(-)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
2-Nitrophenol	2-NP	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,4-Dimethylphenol	2,4-DMP	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,4-Dichlorophenol	2,4-DCP	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,4,6-Trichlorophenol	2,4,6-TCP	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
bis(2-Chloroethyl)ether	b(2-c)E	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Hexachloroethane	HCE	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Nitrobenzene	Nitrobenzene	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Isophorone	IP	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
bis(2-Chloroethoxy)methane	b(2-c)M	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Hexachlorobutadiene	HCBD	(-)	(-)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Hexachlorocyclopentadiene	HCCPD	(-)	(-)	0.81	U	4	U	1.6	U	0.5	U	3.4	U	1.1	U	0.21	U	0.85	U	0.21	U
2-Chloronaphthalene	2-CNP	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Dimethylphthalate	DMP	(-)	(-)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
2-Methylphenol	2-MP	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
4-Methylphenol	4-MP	(-)	(-)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
4-Chloroaniline	4-CLA	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2,4,5-Trichlorophenol	2,4,5-TCP	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
2-Nitroaniline	2-NA	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Atrazine	Atrazine	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Caprolactam	Caprolactam	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
Benzaldehyde	Benzald	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
4-Nitrophenol	4-NP	(-)	(-)	0.81	U	4	U	1.6	U	0.5	U	3.4	U	1.1	U	0.21	U	0.85	U	0.21	U
2,4-Dinitrotoluene	2,4-DNT	(-)	(-)	0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	0.34	U	0.082	U
Pentachlorophenol	PCP	(-)	(-)	0.81	U	4	U	1.6	U	0.5	U	3.4	U	1.1	U	0.21	U	0.85	U	0.21	U
2,4-Dinitrophenol	2,4-DNP	(-)	(-)	3.2	U	16	U	6.2	U	2	U	14	U	4.2	U	0.82	U	3.4	U	0.82	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(-)	(-)	0.81	U	4	U	1.6	U	0.5	U	3.4	U	1.1	U	0.21	U	0.85	U	0.21	U
2,6-Dinitrotoluene	2,6-DNT	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U
4-Chlorophenyl-phenylether	4-CPPE	(-)	(-)	0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	0.17	U	0.04	U

U = The compound was not detected at the indicated concentration.

J = Estimated value; ND = not detected.

(<sup>1</sup>) New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(-) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-8**  
**Semi-Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in):	SED-11-C/0-6	SED-08-A/0-6	SED-08-C/0-6	SED-07-A/0-6	SED-07-B/0-6	SED-07-C/0-6	SED-10-A/0-6	SED-10-B/0-6	SED-10-C/0-6
Date Sampled:	12/20/02	12/20/02	12/20/02	12/20/02	12/20/02	12/20/02	12/19/02	12/19/02	12/19/02
Lab Sample No.:	3967899	3967903	3967885	3967897	3967859	3967901	3967871	3967873	3967862
Laboratory:	Lancaster								

SVOCs (cont'd) (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Flow Direction	Spa Spring Creek				Woodbridge Creek	Flow									
					U	1.6	U	0.62	U		0.082	U	0.34	U	0.082	U			
Diethylphthalate	DEP	(--)	(--)		0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	
N-Nitrosodiphenylamine	NDPhA	(--)	(--)		0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.062	J	
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)		0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	
Hexachlorobenzene	HCB	0.02	24		0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	
Di-n-butylphthalate	DBP	(--)	(--)		0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	
Butylbenzylphthalate	BBP	(--)	(--)		0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)		0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	
bis(2-Ethyhexyl)phthalate	B(2-EH)P	(--)	(--)		0.32	U	1.6	U	0.86	J	0.5	J	1.4	U	0.42	U	0.46	1	
Di-n-octylphthalate	DOP	(--)	(--)		0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	
3-Nitroaniline	3-NA	(--)	(--)		0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	
Dibenzofuran	DBF	(--)	(--)		0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	
4-Nitroaniline	4-NA	(--)	(--)		0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	
Carbazole	Carbazole	(--)	(--)		0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	
1,1'-Biphenyl	1,1-BP	(--)	(--)		0.17	U	0.81	U	0.32	U	0.098	U	0.68	U	0.21	U	0.04	U	
Acetophenone	Acetophen	(--)	(--)		0.32	U	1.6	U	0.62	U	0.2	U	1.4	U	0.42	U	0.082	U	
Total Targeted SVOCs		(--)	(--)		0.1055		0.4061		3.4		5.391		0.166		0.135		1.9187	10.766	7.854
Total TICs		(--)	(--)		119.8		1155.2		134.3		107.2		494.3		154.7		17.84	52	20.67
Total PAHs		4	45		0.1055		0.4061		2.54		4.891		0.166		0.135		1.3967	8.276	2.654
Total SVOCs		(--)	(--)		119.9055		1155.6061		137.7		112.591		494.466		154.835		19.7587	62.766	28.524

U = The compound was not detected at the indicated concentration.

J = Estimated value; ND = not detected.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-8**  
**Semi-Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-09-A/0-6    SED-09-B/0-6    SED-09-C/0-6    SED-09-C/33-39 SED-06-A/0-6    SED-06-B/0-6    SED-06-C/0-6    SED-05-A/0-6    SED-05-B/0-6  
 Date Sampled: 12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02  
 Lab Sample No.: 3967877    3967869    3967864    3967865    3967875    3967879    3967867    3967907    3967909  
 Laboratory: Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster

SVOCs (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Woodbridge Creek																	
Naphthalene	Naphthalene	0.16	2.1	0.024	J	0.068		0.049		5.9		0.01	U	0.012	J	0.029	J	0.092	J	0.0062	U
2-Methylnaphthalene	2-MNap	0.07	0.67	0.017		0.067		0.032		21		0.004	U	0.011		0.024		0.049	J	0.0059	J
Acenaphthylene	ACPL	0.044	0.64	0.053		0.052		0.083		0.97		0.008	J	0.019		0.05		0.088		0.0071	J
Acenaphthene	ACP	0.016	0.5	0.032		0.2		0.099		1.9		0.004	U	0.0052	J	0.056		0.045	J	0.0025	U
Fluorene	Fluorene	0.019	0.54	0.028		0.22		0.085		3.8		0.0061	J	0.0064	J	0.059		0.072		0.003	J
Phenanthrene	PhA	0.24	1.5	0.11		2		0.95		18		0.018		0.038		0.72		0.7		0.025	
Anthracene	ANT	0.085	1.1	0.29		0.67		0.31		3.1		0.011	J	0.033		0.2		0.19		0.011	
Fluoranthene	Fluoranthene	0.6	5.1	0.71		2.3		2.1		5.5		0.041		0.13		1.2		1.1		0.076	
Pyrene	Pyrene	0.665	2.6	1.9		4.6		2.9		13		0.11		0.71		1.7		2.3		0.2	
Benzo(a)anthracene	B(a)A	0.261	1.6	0.69		1.9		1.2		6.5		0.034		0.15		0.8		0.83		0.066	
Chrysene	Chrysene	0.384	2.8	1.1		2.1		1.7		11		0.052		0.27		1.1		1.1		0.083	
Benzo(b)fluoranthene	B(b)F	(-)	(-)	0.68		2.1		2.3		9.6		0.071		0.28		1.4		1.2		0.19	
Benzo(k)fluoranthene	B(k)F	0.24	1340	0.21		0.95		0.71		1.2		0.022		0.077		0.46		0.43		0.044	
Benzo(a)pyrene	B(a)P	0.43	1.6	0.55		1.7		1.5		13		0.044		0.21		0.94		1.3		0.2	
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	0.2	320	0.17		0.99		0.8		4.1		0.028		0.07		0.44		0.64		0.1	
Dibenz(a,h)anthracene	DB(a,h)a	0.063	0.26	0.07		0.28		0.23		4		0.011	J	0.031		0.14		0.28		0.064	
Benzo(g,h,i)perylene	B(g,h,i)P	0.17	320	0.24		1		1		18		0.049		0.1		0.54		1.2		0.27	
Phenol	Phenol	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2-Chlorophenol	2-CP	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
N-Nitroso-di-n-propylamine	NDPA	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Chloro-3-methylphenol	4-C-3-MP	(-)	(-)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
2-Nitrophenol	2-NP	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,4-Dimethylphenol	2,4-DMP	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,4-Dichlorophenol	2,4-DCP	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,4,6-Trichlorophenol	2,4,6-TCP	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
bis(2-Chloroethyl)ether	b(2-c)E	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Hexachloroethane	HCE	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Nitrobenzene	Nitrobenzene	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Isophorone	IP	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
bis(2-Chloroethoxy)methane	b(2-c)M	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Hexachlorobutadiene	HCBD	(-)	(-)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Hexachlorocyclopentadiene	HCCPD	(-)	(-)	0.69	U	0.44	U	1.7	U	3.7	U	0.85	U	0.43	U	1.4	U	1.2	U	0.21	U
2-Chloronaphthalene	2-CNP	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Dimethylphthalate	DMP	(-)	(-)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
2-Methylphenol	2-MP	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Methylphenol	4-MP	(-)	(-)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
4-Chloroaniline	4-CLA	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2,4,5-Trichlorophenol	2,4,5-TCP	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
2-Nitroaniline	2-NA	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Atrazine	Atrazine	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Caprolactam	Caprolactam	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Benzaldehyde	Benzald	(-)	(-)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Nitrophenol	4-NP	(-)	(-)	0.69	U	0.44	U	2	U	3.7	U	0.85	U	0.43	U	1.4	U	1.2	U	0.21	U
2,4-Dinitrotoluene	2,4-DNT	(-)	(-)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Pentachlorophenol	PCP	(-)	(-)	0.69	U	0.44	U	2	U	3.7	U	0.85	U	0.43	U	1.4	U	1.2	U	0.21	U
2,4-Dinitrophenol	2,4-DNP	(-)	(-)	2.7	U	1.7	U	7	U	15	U	3.4	U	1.7	U	5.6	U	4.6	U	0.83	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(-)	(-)	0.69	U	0.44	U	2	U	3.7	U	0.85	U	0.43	U	1.4	U	1.2	U	0.21	U
2,6-Dinitrotoluene	2,6-DNT	(-)	(-)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Chlorophenyl-phenylether	4-CPPE	(-)	(-)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U

U = The compound was not detected at the indicated concentration.

J = Estimated value; ND = not detected.

(<sup>1</sup>) New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(-) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-8**  
**Semi-Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-09-A/0-6    SED-09-B/0-6    SED-09-C/0-6    SED-09-C/33-39 SED-06-A/0-6    SED-06-B/0-6    SED-06-C/0-6    SED-05-A/0-6    SED-05-B/0-6  
 Date Sampled: 12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02  
 Lab Sample No.: 3967877    3967869    3967864    3967865    3967875    3967879    3967867    3967907    3967909  
 Laboratory: Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster

SVOCs (cont'd) (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Woodbridge Creek																	
Diethylphthalate	DEP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Hexachlorobenzene	HCB	0.02	24	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Di-n-butylphthalate	DBP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Butylbenzylphthalate	BBP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
bis(2-Ethylhexyl)phthalate	B(2-EH)P	(--)	(--)	4.2		1.4		7		37		0.69	J	0.71	J	3.1		2.1	J	0.51	
Di-n-octylphthalate	DOP	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
3-Nitroaniline	3-NA	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Dibenzofuran	DBF	(--)	(--)	0.14	U	0.09	U	0.3	U	1.9	J	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
4-Nitroaniline	4-NA	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Carbazole	Carbazole	(--)	(--)	0.14	U	0.09	U	0.3	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	0.14	U	0.09	U	0.34	U	0.73	U	0.17	U	0.086	U	0.29	U	0.24	U	0.041	U
Acetophenone	Acetophen	(--)	(--)	0.27	U	0.17	U	0.7	U	1.5	U	0.34	U	0.17	U	0.56	U	0.46	U	0.083	U
Total Targeted SVOCs		(--)	(--)	11.074		22.597		23.048		179.47		1.1951		2.8626		12.958		13.716		1.855	
Total TICs		(--)	(--)	66.3		29.2		190.3		1181		123.89		29.38		65.5		75.6		25.49	
Total PAHs		4	45	6.874		21.197		16.048		140.57		0.5051		2.1526		9.858		11.616		1.345	
Total SVOCs		(--)	(--)	77.374		51.797		213.348		1360.47		125.0851		32.2426		78.458		89.316		27.345	

U = The compound was not detected at the indicated concentration.

J = Estimated value; ND = not detected.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-8**  
**Semi-Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in):	SED-05-C/0-6	SED-04-A/0-6	SED-04-A/39-45	SED-04-B/0-6	SED-04-C/0-6	SED-03-A/0-6	SED-03-B/0-6	SED-03-C/0-6	SED-03-C/12-18
Date Sampled:	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02
Lab Sample No.:	3967855	3967911	3967912	3967915	3967917	3967919	3967857	3967921	3967922
Laboratory:	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

SVOCs (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Woodbridge Creek																	
				U	J	U	J	U	J	U	J	U	J	U	J						
Naphthalene	Naphthalene	0.16	2.1	0.13	0.04	U	<b>0.42</b>	0.036	0.0041	J	0.065	J	0.086	J	<b>3.4</b>	<b>10</b>					
2-Methylnaphthalene	2-MNap	0.07	0.67	<b>0.13</b>	0.027	J	<b>1.4</b>	0.031	0.0034	J	0.042	J	<b>0.093</b>	<b>7.5</b>	<b>39</b>						
Acenaphthylene	ACPL	<b>0.044</b>	<b>0.64</b>	<b>0.11</b>	<b>0.063</b>	J	<b>0.29</b>	0.025	0.0012	J	<b>0.15</b>		<b>0.13</b>	<b>0.8</b>	<b>1.2</b>						
Acenaphthene	ACP	0.016	0.5	<b>0.068</b>	<b>0.036</b>	J	<b>0.64</b>	<b>0.092</b>	0.0015	J	<b>0.086</b>	J	<b>0.26</b>	<b>1.9</b>	<b>2.8</b>						
Fluorene	Fluorene	0.019	0.54	<b>0.065</b>	<b>0.052</b>	J	<b>1.1</b>	<b>0.092</b>	0.003	J	0.019	U	<b>0.25</b>	<b>3.7</b>	<b>5.8</b>						
Phenanthrene	PhA	0.24	1.5	0.17	<b>0.6</b>		<b>4.5</b>	1	0.011		<b>0.25</b>		<b>2.5</b>	<b>11</b>	<b>10</b>						
Anthracene	ANT	<b>0.085</b>	<b>1.1</b>	<b>0.18</b>	<b>0.2</b>		<b>0.97</b>	<b>0.28</b>	0.003	J	<b>0.36</b>		<b>0.95</b>	<b>1.9</b>	<b>1.4</b>						
Fluoranthene	Fluoranthene	0.6	5.1	<b>1.1</b>	<b>1.2</b>		<b>2.5</b>	<b>1.1</b>	0.021		<b>2</b>		<b>4.8</b>	<b>4.2</b>	<b>3.7</b>						
Pyrene	Pyrene	<b>0.665</b>	<b>2.6</b>	<b>1.4</b>	<b>1.8</b>		<b>6.1</b>	<b>1.4</b>	0.027		<b>5.2</b>		<b>6</b>	<b>8.6</b>	<b>5.1</b>						
Benzo(a)anthracene	B(a)A	0.261	1.6	<b>0.54</b>	<b>0.72</b>		<b>2</b>	<b>0.51</b>	0.0081		<b>1.3</b>		<b>2.9</b>	<b>3.9</b>	<b>1.4</b>						
Chrysene	Chrysene	<b>0.384</b>	<b>2.8</b>	<b>0.96</b>	<b>1</b>		<b>2.8</b>	<b>0.68</b>	0.011		<b>2.3</b>		<b>3.6</b>	<b>7.5</b>	<b>2.5</b>						
Benzo(b)fluoranthene	B(b)F	(--)	(--)	0.98	1.3		1.6	0.69	0.017		1.6		3.8	5.9	1.4						
Benzo(k)fluoranthene	B(k)F	0.24	1340	<b>0.32</b>	<b>0.44</b>		<b>0.46</b>	0.24	0.0056		<b>0.44</b>		1.3	<b>1.1</b>	<b>0.46</b>						
Benzo(a)pyrene	B(a)P	0.43	1.6	<b>0.71</b>	<b>1.1</b>		<b>2</b>	<b>0.6</b>	0.01		<b>1.1</b>		<b>3.3</b>	<b>8.5</b>	<b>1.1</b>						
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	0.2	320	<b>0.54</b>	<b>0.76</b>		<b>0.86</b>	<b>0.41</b>	0.0076		<b>0.72</b>		<b>1.9</b>	<b>3.6</b>	<b>0.69</b>						
Dibenz(a,h)anthracene	DB(a,h)a	0.063	0.26	<b>0.17</b>	<b>0.2</b>		<b>0.48</b>	<b>0.11</b>	0.0018	J	<b>0.35</b>		<b>0.59</b>	<b>3.1</b>	<b>0.22</b>						
Benzo(g,h,i)perylene	B(g,h,i)P	0.17	320	<b>0.68</b>	<b>1</b>		<b>2.4</b>	<b>0.5</b>	0.011		<b>1.6</b>		<b>2.1</b>	<b>14</b>	<b>0.94</b>						
Phenol	Phenol	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2-Chlorophenol	2-CP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
N-Nitroso-di-n-propylamine	NDPA	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Chloro-3-methylphenol	4-C-3-MP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
2-Nitrophenol	2-NP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,4-Dimethylphenol	2,4-DMP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,4-Dichlorophenol	2,4-DCP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,4,6-Trichlorophenol	2,4,6-TCP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
bis(2-Chloroethyl)ether	b(2-c)E	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Hexachloroethane	HCE	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Nitrobenzene	Nitrobenzene	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Isophorone	IP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
bis(2-Chloroethoxy)methane	b(2-c)M	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Hexachlorobutadiene	HCBD	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Hexachlorocyclopentadiene	HCCPD	(--)	(--)	6.5	U	0.27	U	2.8	U	0.22	U	0.4	U	2	U	0.62	U	4.1	U	4.2	U
2-Chloronaphthalene	2-CNP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Dimethylphthalate	DMP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
2-Methylphenol	2-MP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Methylphenol	4-MP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
4-Chloroaniline	4-CLA	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2,4,5-Trichlorophenol	2,4,5-TCP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
2-Nitroaniline	2-NA	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Atrazine	Atrazine	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Caprolactam	Caprolactam	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Benzaldehyde	Benzald	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Nitrophenol	4-NP	(--)	(--)	6.5	U	0.27	U	2.8	U	0.22	U	0.4	U	2	U	0.62	U	4.1	U	4.2	U
2,4-Dinitrotoluene	2,4-DNT	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Pentachlorophenol	PCP	(--)	(--)	6.5	U	0.27	U	2.8	U	0.22	U	0.4	U	2	U	0.62	U	4.1	U	4.2	U
2,4-Dinitrophenol	2,4-DNP	(--)	(--)	26	U	1.1	U	11	U	0.85	U	1.6	U	7.8	U	2.4	U	16	U	16	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(--)	(--)	6.5	U	0.27	U	2.8	U	0.22	U	0.4	U	2	U	0.62	U	4.1	U	4.2	U
2,6-Dinitrotoluene	2,6-DNT	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Chlorophenyl-phenylether	4-CPPE	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U

U = The compound was not detected at the indicated concentration.

J = Estimated value; ND = not detected.

(<sup>1</sup>) New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-8**  
**Semi-Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-05-C/0-6    SED-04-A/0-6    SED-04-A/39-45    SED-04-B/0-6    SED-04-C/0-6    SED-03-A/0-6    SED-03-B/0-6    SED-03-C/0-6    SED-03-C/12-18  
 Date Sampled: 12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02  
 Lab Sample No.: 3967855    3967911    3967912    3967915    3967917    3967919    3967857    3967921    3967922  
 Laboratory: Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster

SVOCs (cont'd) (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Woodbridge Creek																	
Diethylphthalate	DEP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Hexachlorobenzene	HCB	0.02	24	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Di-n-butylphthalate	DBP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Butylbenzylphthalate	BBP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
bis(2-Ethyhexyl)phthalate	B(2-EH)P	(--)	(--)	18		2.3		5.2	J	0.85		0.17	J	50		1.7		12		8	J
Di-n-octylphthalate	DOP	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
3-Nitroaniline	3-NA	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Dibenzofuran	DBF	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	1.9	J	3.9	J
4-Nitroaniline	4-NA	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Carbazole	Carbazole	(--)	(--)	1.3	U	0.087	J	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	1.3	U	0.053	U	0.53	U	0.042	U	0.078	U	0.4	U	0.13	U	0.8	U	0.81	U
Acetophenone	Acetophen	(--)	(--)	2.6	U	0.11	U	1.1	U	0.085	U	0.16	U	0.78	U	0.24	U	1.6	U	1.6	U
Total Targeted SVOCs		(--)	(--)	26.253		12.885		35.72		8.646		0.3173		67.563		36.259		104.5		99.61	
Total TICs		(--)	(--)	184.2		52.5		586		33.14		56.17		485		67.6		1403		2204	
Total PAHs		4	45	<b>8.253</b>		<b>10.498</b>		<b>30.52</b>		<b>7.796</b>		0.1473		<b>17.563</b>		<b>34.559</b>		<b>90.6</b>		<b>87.71</b>	
Total SVOCs		(--)	(--)	210.453		65.385		621.72		41.786		56.4873		552.563		103.859		1507.5		2303.61	

U = The compound was not detected at the indicated concentration.

J = Estimated value; ND = not detected.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-8**  
**Semi-Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-03-C/30-36    SED-02-A/0-6    SED-02-B/0-6    SED-02-B/0-6D    SED-02-C/0-6    SED-01-A/0-6    SED-01-B/0-6    SED-01-C/0-6    SED-16-C/0-6  
 Date Sampled: 12/19/02    12/20/02    12/20/02    12/20/02    12/20/02    12/20/02    12/20/02    12/20/02    12/17/02  
 Lab Sample No.: 3967923    3967892    3967889    3967890    3967894    3967881    3967883    3967905    3964485  
 Laboratory: Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster

SVOCs (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Woodbridge Creek												Arthur Kill							
				0.16	2.1	3.4	0.1	J	0.19	0.036	U	0.071	J	0.039	J	0.042	0.089	0.11					
Naphthalene	Naphthalene	0.16	2.1			3.4	0.1	J	0.19	0.036	U	0.071	J	0.039	J	0.042	0.089	0.11					
2-Methylnaphthalene	2-MNap	0.07	0.67			8.9	0.069	J	0.15	0.032	J	0.056	J	0.029	J	0.039	0.05	0.065					
Acenaphthylene	ACPL	0.044	0.64			0.33	0.11		0.046	J	0.057	J	0.11		0.062		0.059	0.17	0.15				
Acenaphthene	ACP	0.016	0.5			0.46	0.034	J	0.45	0.068		0.037	J	0.012	J	0.077		0.084	0.027				
Fluorene	Fluorene	0.019	0.54			0.99	0.049	J	0.5	0.14		0.037	J	0.022		0.069	0.1	0.05					
Phenanthrene	PhA	0.24	1.5			2.8	0.33		4.9	1.7		0.2		0.13		0.61	0.29	0.2					
Anthracene	ANT	0.085	1.1			0.32	0.24		1.3	0.47		0.22		0.086		0.2	0.5	0.25					
Fluoranthene	Fluoranthene	0.6	5.1			1	1.3		4.8	2.2		0.94		0.64		1	1.3	1					
Pyrene	Pyrene	0.665	2.6			1.8	1.6		5.1	2.3		3.3		0.72		1.3	2.6	1.3					
Benzo(a)anthracene	B(a)A	0.261	1.6			0.4	0.55		2.1	1		0.65		0.31		0.61	0.59	0.44					
Chrysene	Chrysene	0.384	2.8			0.53	0.83		2.3	1.4		1.4		0.23		0.91	1.2	0.7					
Benzo(b)fluoranthene	B(b)F	(--)	(--)			0.39	1.2		2.6	1.3		1.5		0.55		1	0.7	0.9					
Benzo(k)fluoranthene	B(k)F	0.24	1340			0.11	0.4		0.99	0.48		0.48		0.2		0.36	0.19	0.33					
Benzo(a)pyrene	B(a)P	0.43	1.6			0.29	0.78		2.2	0.97		1.4		0.39		0.86	0.42	0.65					
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	0.2	320			0.16	0.58		1.4	0.55		0.75		0.36		0.64	0.16	0.36					
Dibenz(a,h)anthracene	DB(a,h)a	0.063	0.26			0.058	J	0.17	0.34	0.17		0.37		0.096		0.21	0.059	0.094					
Benzo(g,h,i)perylene	B(g,h,i)P	0.17	320			0.25			0.76	1.6		0.64		1.5		0.42	0.87	0.2	0.33				
Phenol	Phenol	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2-Chlorophenol	2-CP	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
N-Nitroso-di-n-propylamine	NDPA	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Chloro-3-methylphenol	4-C-3-MP	(--)	(--)			0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
2-Nitrophenol	2-NP	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2,4-Dimethylphenol	2,4-DMP	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2,4-Dichlorophenol	2,4-DCP	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2,4,6-Trichlorophenol	2,4,6-TCP	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
bis(2-Chloroethyl)ether	b(2-c)E	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Hexachloroethane	HCE	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Nitrobenzene	Nitrobenzene	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Isophorone	IP	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
bis(2-Chloroethoxy)methane	b(2-c)M	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Hexachlorobutadiene	HCBD	(--)	(--)			0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Hexachlorocyclopentadiene	HCCPD	(--)	(--)			2	U	0.38	U	0.24	U	0.24	U	3.4	U	0.91	U	0.56	U	1.9	U	0.53	U
2-Chloronaphthalene	2-CNP	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Dimethylphthalate	DMP	(--)	(--)			0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
2-Methylphenol	2-MP	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Methylphenol	4-MP	(--)	(--)			0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
4-Chloroaniline	4-CLA	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.27	J
2,4,5-Trichlorophenol	2,4,5-TCP	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
2-Nitroaniline	2-NA	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Atrazine	Atrazine	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Caprolactam	Caprolactam	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Benzaldehyde	Benzald	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.13	J
4-Nitrophenol	4-NP	(--)	(--)			2	U	0.38	U	0.24	U	0.24	U	3.4	U	0.91	U	0.56	U	1.9	U	0.53	U
2,4-Dinitrotoluene	2,4-DNT	(--)	(--)			0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Pentachlorophenol	PCP	(--)	(--)			2	U	0.38	U	0.24	U	0.24	U	3.4	U	0.91	U	0.56	U	1.9	U	0.53	U
2,4-Dinitrophenol	2,4-DNP	(--)	(--)			8	U	1.5	U	1	U	1	U	13	U	3.6	U	2.2	U	7.4	U	2.1	U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(--)	(--)			2	U	0.38	U	0.24	U	0.24	U	3.4	U	0.91	U	0.56	U	1.9	U	0.53	U
2,6-Dinitrotoluene	2,6-DNT	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Chlorophenyl-phenylether	4-CPPE	(--)	(--)			0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U

U = The compound was not detected at the indicated concentration.

J = Estimated value; ND = not detected.

(<sup>1</sup>) New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-8**  
**Semi-Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-03-C/30-36    SED-02-A/0-6    SED-02-B/0-6    SED-02-B/0-6D    SED-02-C/0-6    SED-01-A/0-6    SED-01-B/0-6    SED-01-C/0-6    SED-16-C/0-6  
 Date Sampled: 12/19/02    12/20/02    12/20/02    12/20/02    12/20/02    12/20/02    12/20/02    12/20/02    12/17/02  
 Lab Sample No.: 3967923    3967892    3967889    3967890    3967894    3967881    3967883    3967905    3964485  
 Laboratory: Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster

SVOCs (cont'd) (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Woodbridge Creek				⇒				⇒				⇒				Arthur Kill	
Diethylphthalate	DEP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Hexachlorobenzene	HCB	0.02	24	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Di-n-butylphthalate	DBP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Butylbenzylphthalate	BBP	(--)	(--)	0.8	U	0.25	J	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
bis(2-Ethylhexyl)phthalate	B(2-EH)P	(--)	(--)	0.8	U	4.3		2.1		1		20		6.5		3.2		0.74	U	21	
Di-n-octylphthalate	DOP	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
3-Nitroaniline	3-NA	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Dibenzofuran	DBF	(--)	(--)	0.79	J	0.075	U	0.07	J	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
4-Nitroaniline	4-NA	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Carbazole	Carbazole	(--)	(--)	0.41	U	0.075	U	0.13	J	0.047	U	0.66	U	0.18	U	0.2	J	0.38	U	0.1	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	0.41	U	0.075	U	0.047	U	0.047	U	0.66	U	0.18	U	0.11	U	0.38	U	0.1	U
Acetophenone	Acetophen	(--)	(--)	0.8	U	0.15	U	0.096	U	0.096	U	1.3	U	0.36	U	0.22	U	0.74	U	0.21	U
Total Targeted SVOCs		(--)	(--)	22.978		13.652		33.266		14.477		33.021		10.796		12.256		8.702		28.356	
Total TICs		(--)	(--)	476		107.8		43.12		37.84		157		80.1		65.4		101.7		107.7	
Total PAHs		4	45	<b>22.188</b>		<b>9.102</b>		<b>30.966</b>		<b>13.477</b>		<b>13.021</b>		<b>4.296</b>		<b>8.856</b>		<b>8.702</b>		<b>6.956</b>	
Total SVOCs		(--)	(--)	498.978		121.452		76.386		52.317		190.021		90.896		77.656		110.402		136.056	

U = The compound was not detected at the indicated concentration.

J = Estimated value; ND = not detected.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-8**  
**Semi-Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-13-C/0-6    SED-13-C/0-6D    SED-14-C/0-6    SED-18-C/0-6    SED-15-C/0-6    SED-17-C/0-6    FB121902    FB122002  
 Date Sampled: 12/17/02    12/17/02    12/17/02    12/17/02    12/17/02    12/17/02    12/19/02    12/20/02  
 Lab Sample No.: 3964479&80    3964481&82    3964483&84    3964488    3964477&78    3964486    3967924    3967895  
 Laboratory: Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster

SVOCs (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Arthur Kill	↔	↔	↔	Field Blanks (ppb)
Naphthalene	Naphthalene	0.16	2.1	0.1	0.11	0.15	0.094	0.1    0.8
2-Methylnaphthalene	2-MNap	0.07	0.67	0.069	0.07	<b>0.085</b>	0.069	0.064    0.67
Acenaphthylene	ACPL	0.044	0.64	<b>0.14</b>	<b>0.14</b>	<b>0.15</b>	<b>0.12</b>	<b>0.15</b> <b>0.59</b>
Acenaphthene	ACP	0.016	0.5	<b>0.077</b>	<b>0.067</b>	<b>0.46</b>	<b>0.065</b>	<b>0.04</b> 3.9
Fluorene	Fluorene	0.019	0.54	<b>0.085</b>	<b>0.077</b>	<b>0.21</b>	<b>0.069</b>	<b>0.053</b> 1.2
Phenanthrene	PhA	0.24	1.5	0.3	0.3	0.28	0.34	0.36    2.2
Anthracene	ANT	0.085	1.1	<b>0.29</b>	<b>0.26</b>	<b>0.31</b>	<b>0.27</b>	<b>0.3</b> 2.4
Fluoranthene	Fluoranthene	0.6	5.1	1.2	1.1	1.3	<b>0.92</b>	1.1    6.4
Pyrene	Pyrene	0.665	2.6	1.3	1.3	1.6	1.2	1.4    7.3
Benzo(a)anthracene	B(a)A	0.261	1.6	<b>0.56</b>	<b>0.52</b>	<b>0.61</b>	<b>0.52</b>	<b>0.65</b> 3.7
Chrysene	Chrysene	0.384	2.8	<b>0.68</b>	<b>0.59</b>	<b>0.62</b>	<b>0.67</b>	<b>0.94</b> 3.8
Benzo(b)fluoranthene	B(b)F	(--)	(--)	0.94	0.9	0.91	0.21	1.3    3.7
Benzo(k)fluoranthene	B(k)F	0.24	1340	0.37	<b>0.26</b>	<b>0.34</b>	<b>0.33</b>	<b>0.44</b> 1.2
Benzo(a)pyrene	B(a)P	0.43	1.6	<b>0.66</b>	<b>0.6</b>	<b>0.65</b>	<b>0.61</b>	<b>0.85</b> 3.2
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	0.2	320	0.38	<b>0.35</b>	<b>0.35</b>	<b>0.3</b>	<b>0.64</b> 1.6
Dibenz(a,h)anthracene	DB(a,h)a	0.063	0.26	0.1	<b>0.097</b>	<b>0.092</b>	<b>0.084</b>	<b>0.15</b> 0.47
Benzo(g,h,i)perylene	B(g,h,i)P	0.17	320	0.37	<b>0.35</b>	<b>0.32</b>	<b>0.26</b>	<b>0.63</b> 1.7
Phenol	Phenol	(--)	(--)	0.099	U	0.09	U	0.1    0.068
2-Chlorophenol	2-CP	(--)	(--)	0.099	U	0.09	U	0.1    0.068
N-Nitroso-di-n-propylamine	NDPA	(--)	(--)	0.099	U	0.09	U	0.1    0.068
4-Chloro-3-methylphenol	4-C-3-MP	(--)	(--)	0.2	U	0.18	U	0.21    0.14
2-Nitrophenol	2-NP	(--)	(--)	0.099	U	0.09	U	0.1    0.068
2,4-Dimethylphenol	2,4-DMP	(--)	(--)	0.099	U	0.09	U	0.1    0.068
2,4-Dichlorophenol	2,4-DCP	(--)	(--)	0.099	U	0.09	U	0.1    0.068
2,4,6-Trichlorophenol	2,4,6-TCP	(--)	(--)	0.099	U	0.09	U	0.1    0.068
bis(2-Chloroethyl)ether	b(2-c)E	(--)	(--)	0.099	U	0.09	U	0.1    0.068
Hexachloroethane	HCE	(--)	(--)	0.099	U	0.09	U	0.1    0.068
Nitrobenzene	Nitrobenzene	(--)	(--)	0.099	U	0.09	U	0.1    0.068
Isophorone	IP	(--)	(--)	0.099	U	0.09	U	0.1    0.068
bis(2-Chloroethoxy)methane	b(2-c)M	(--)	(--)	0.099	U	0.09	U	0.1    0.068
Hexachlorobutadiene	HCBD	(--)	(--)	0.2	U	0.18	U	0.21    0.14
Hexachlorocyclopentadiene	HCCPD	(--)	(--)	0.51	U	0.46	U	0.52    0.35
2-Chloronaphthalene	2-CNP	(--)	(--)	0.099	U	0.09	U	0.1    0.068
Dimethylphthalate	DMP	(--)	(--)	0.2	U	0.18	U	0.21    0.14
2-Methylphenol	2-MP	(--)	(--)	0.099	U	0.09	U	0.1    0.068
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	(--)	(--)	0.099	U	0.09	U	0.1    0.068
4-Methylphenol	4-MP	(--)	(--)	0.2	U	0.18	U	0.21    0.14
4-Chloroaniline	4-CLA	(--)	(--)	0.099	U	0.09	U	0.1    0.068
2,4,5-Trichlorophenol	2,4,5-TCP	(--)	(--)	0.099	U	0.09	U	0.1    0.068
2-Nitroaniline	2-NA	(--)	(--)	0.099	U	0.09	U	0.1    0.068
Atrazine	Atrazine	(--)	(--)	0.099	U	0.09	U	0.1    0.068
Caprolactam	Caprolactam	(--)	(--)	0.099	U	0.09	U	0.1    0.068
Benzaldehyde	Benzald	(--)	(--)	0.1	J	0.11	J	0.13    0.09
4-Nitrophenol	4-NP	(--)	(--)	0.51	U	0.46	U	0.52    0.35
2,4-Dinitrotoluene	2,4-DNT	(--)	(--)	0.2	U	0.18	U	0.21    0.14
Pentachlorophenol	PCP	(--)	(--)	0.51	U	0.46	U	0.52    0.35
2,4-Dinitrophenol	2,4-DNP	(--)	(--)	2	U	1.8	U	2.1    1.4
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	(--)	(--)	0.51	U	0.46	U	0.52    0.35
2,6-Dinitrotoluene	2,6-DNT	(--)	(--)	0.099	U	0.09	U	0.1    0.068
4-Chlorophenyl-phenylether	4-CPPE	(--)	(--)	0.099	U	0.09	U	0.1    0.068

U = The compound was not detected at the indicated concentration.

J = Estimated value; ND = not detected.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-8**  
**Semi-Volatile Organic Compounds in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-13-C/0-6	SED-13-C/0-6D	SED-14-C/0-6	SED-18-C/0-6	SED-15-C/0-6	SED-17-C/0-6	FB121902	FB122002
Date Sampled: 12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/19/02	12/20/02
Lab Sample No.: 3964479&80	3964481&82	3964483&84	3964488	3964477&78	3964486	3967924	3967895
Laboratory: Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

SVOCs (cont'd) (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Arthur Kill			⇒			⇒			⇒			Field Blanks (ppb)			
Diethylphthalate	DEP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
N-Nitrosodiphenylamine	NDPhA	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	2	U	2	U
4-Bromophenyl-phenylether	4-BPPE	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Hexachlorobenzene	HCB	0.02	24	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.068	U	1	U	1	U
Di-n-butylphthalate	DBP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
Butylbenzylphthalate	BBP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
3,3'-Dichlorobenzidine	3,3'-DCBd	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
bis(2-Ethyhexyl)phthalate	B(2-EH)P	(--)	(--)	4.5		4.8		3.7		4.7		3.9		0.14	U	2	U	4	J
Di-n-octylphthalate	DOP	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	2	U
3-Nitroaniline	3-NA	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
Dibenzofuran	DBF	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.48	J	1	U	1	U
4-Nitroaniline	4-NA	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	1	U	1	U
Carbazole	Carbazole	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.12	J	1	U	1	U
1,1'-Biphenyl	1,1-BP	(--)	(--)	0.099	U	0.09	U	0.1	U	0.093	U	0.11	U	0.16	J	1	U	1	U
Acetophenone	Acetophen	(--)	(--)	0.2	U	0.18	U	0.21	U	0.19	U	0.23	U	0.14	U	2	U	1	U
Total Targeted SVOCs		(--)	(--)	12.221		12.001		12.267		11.101		13.657		45.68		ND		4	
Total TICs		(--)	(--)	470.8		89.7		85.4		98.3		138.6		101.5		ND		140	
Total PAHs		4	45	<b>7.621</b>		<b>7.091</b>		<b>8.437</b>		<b>6.131</b>		<b>9.167</b>		<b>44.83</b>		ND		ND	
Total SVOCs		(--)	(--)	483.021		101.701		97.667		109.401		152.257		147.18		ND		144	

U = The compound was not detected at the indicated concentration.

J = Estimated value; ND = not detected.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-9**  
**Metals in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in):	SED-11-C/0-6	SED-08-A/0-6	SED-08-C/0-6	SED-07-A/0-6	SED-07-B/0-6	SED-07-C/0-6	SED-10-A/0-6	SED-10-B/0-6	SED-10-C/0-6
Date Sampled:	12/20/02	12/20/02	12/20/02	12/20/02	12/20/02	12/20/02	12/19/02	12/19/02	12/19/02
Lab Sample No.:	3967899	3967903	3967885	3967897	3967859	3967901	3967871	3967873	3967862
Laboratory:	Lancaster								

TAL-Metals (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Flow Direction → Spa Spring Creek →				Woodbridge Creek →				
Aluminum	Al	(-)	(-)	27100	7270	13000	24300	19900	15200	4200	4320	3490
Antimony	Sb	2*	25*		1.7 U	5.6 U	3.4 U	5.8 J	4.8 U	4.4 U	0.85 U	0.88 U
Arsenic	As	8.2	70	10	6.2 J	10.4	164	10.8	9.1	5.3	4.7	5.1
Barium	Ba	(-)	(-)	71.1	54.7 J	76.7	165	56.9 J	43.4 J	18.0	10.7 J	12.4
Beryllium	Be	(-)	(-)	1.7	0.83 J	1.5 J	1.9	1.3 J	0.90 J	0.49 J	0.52 J	0.30 J
Cadmium	Cd	1.2	9.6	1.6 J	1.3 J	1.0 J	2.5 J	0.61 U	0.88 J	0.27 J	0.52 J	0.24 J
Calcium	Ca	(-)	(-)	2810	8250	3870	2570	6190	4650	1210	1220	1040
Chromium, Total	Cr	81	370	37.7	15.0 J	22.8	133	33.8	25.5	11.6	18.0	12.6
Cobalt	Co	(-)	(-)	18.8	18.8 J	36.7	17.7	10.4 J	5.1 J	8.3	6.4	7.5
Copper	Cu	34	270	23.4	23.2 J	33.8	494	69.5	8.2 J	69.6	47.3	85.7
Iron	Fe	(-)	(-)	45000	22700	29400	34700	38000	25700	13300	19000	11900
Lead	Pb	47	218	22.7	17.8	39.7	656	13.8	7.7 J	52.5	35.0	110
Magnesium	Mg	(-)	(-)	6110	7000	5590	6150	10500	6660	1830	1540	1690
Manganese	Mn	(-)	(-)	423	431	1230	209	272	141	71.9	71.6	75.9
Mercury	Hg	0.15	0.71	0.026 U	0.08 U	0.048 U	2.6	0.07 U	0.061 U	0.012 U	0.013 U	0.013 U
Nickel	Ni	21	52	32.9	25.4 J	82.4	85.1	33.7 J	17.0 J	33.7	31.2	28.8
Potassium	K	(-)	(-)	3100	1530	2200	3530	5520	4060	714	723	686
Selenium	Se	(-)	(-)	1.1 U	3.5 U	2.1 U	13.0	3 U	2.7 U	0.53 U	0.54 U	0.54 U
Silver	Ag	1	3.7	0.24 U	0.79 U	0.48 U	2.1 J	0.68 U	0.62 U	0.12 U	0.12 U	0.17 J
Sodium	Na	(-)	(-)	1400	18600	11500	10400	32400	27300	961	1100	929
Thallium	Tl	(-)	(-)	2.4 U	7.7 U	4.7 U	2.8 U	6.6 U	6 U	1.2 U	1.2 U	1.2 U
Vanadium	V	(-)	(-)	54.9	30.0	39.6	109	52.7	39.9	17.0	75.2	13.7
Zinc	Zn	150	410	106	126	1140	573	91.8	58.4 J	457	184	448

U = The compound was not detected at the indicated concentration.

J = Estimated value.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(-) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

\* When no criteria were available from NJDEP, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-9**  
**Metals in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in):	SED-09-A/0-6	SED-09-B/0-6	SED-09-C/0-6	SED-09-C/33-39	SED-06-A/0-6	SED-06-B/0-6	SED-06-C/0-6	SED-05-A/0-6	SED-05-B/0-6
Date Sampled:	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02
Lab Sample No.:	3967877	3967869	3967864	3967865	3967875	3967879	3967867	3967907	3967909
Laboratory:	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

TAL-Metals (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Woodbridge Creek											
Aluminum	Al	(-)	(-)	21000	6090	18000	19100	20900	7180	8410	6360	6820			
Antimony	Sb	2*	25*	1.5	U	0.95	U	1.8	U	5.0	J	1.6	J	1.2	U
Arsenic	As	8.2	70	<b>17.6</b>		5.8	<b>22.0</b>	<b>64.5</b>		<b>14.6</b>		<b>8.5</b>		<b>8.5</b>	<b>11.7</b>
Barium	Ba	(-)	(-)	76.1		17.1	95.2	179	48.3		27.9	51.2		27.8	23.4
Beryllium	Be	(-)	(-)	1.1		0.60	J	1.0	J	1.4		1.0		0.80	0.52
Cadmium	Cd	1.2	9.6	<b>4.3</b>		0.74	J	<b>4.1</b>	J	<b>13.0</b>		0.68	J	<b>1.5</b>	<b>1.6</b>
Calcium	Ca	(-)	(-)	1960	867	3590	5100	3650	2810	1740		2210		10400	
Chromium, Total	Cr	81	370	51.6		22.2	68.5	<b>126</b>		44.4		30.8		37.4	30.9
Cobalt	Co	(-)	(-)	17.6		6.9	18.9	15.3		12.5		9.4	J	8.4	9.1
Copper	Cu	34	270	<b>489</b>		<b>271</b>	<b>545</b>	<b>572</b>		<b>47.2</b>		<b>206</b>		<b>223</b>	<b>595</b>
Iron	Fe	(-)	(-)	30800	13800	32400	30000	39700	22800		16400		21100		24100
Lead	Pb	47	218	<b>86.3</b>		<b>65.3</b>	<b>196</b>	<b>399</b>		27.5		<b>90.4</b>		<b>113</b>	<b>107</b>
Magnesium	Mg	(-)	(-)	6410		1810	6580	5450		8200		2750		3240	2640
Manganese	Mn	(-)	(-)	302		77.1	252	206		366		110		114	108
Mercury	Hg	0.15	0.71	<b>0.45</b>		<b>0.19</b>		<b>1.4</b>		<b>4.0</b>		0.078	J	<b>0.47</b>	<b>0.19</b>
Nickel	Ni	21	52	<b>290</b>		<b>43.9</b>	<b>94.5</b>	<b>117</b>		<b>42.0</b>		<b>59.8</b>		<b>38.4</b>	<b>86.9</b>
Potassium	K	(-)	(-)	3730	997	3570	2810	5200		1260		1640		1050	568
Selenium	Se	(-)	(-)	9.9		1.4	17.8	154		0.88	U	4.4		9.8	3.9
Silver	Ag	1	3.7	0.54	J	0.60	J	<b>1.8</b>	J	<b>3.6</b>	J	0.2	U	0.29	J
Sodium	Na	(-)	(-)	7000		1990	9940	8970		6820		2100		4870	3290
Thallium	Tl	(-)	(-)	2	U	1.3	U	2.5	U	2.1	U	2	U	1.3	U
Vanadium	V	(-)	(-)	51.7		23.3	61.1	100		54.2		29.1		32.2	33.6
Zinc	Zn	150	410	<b>251</b>		<b>218</b>	<b>542</b>	<b>775</b>		135		<b>323</b>		<b>258</b>	<b>359</b>

U = The compound was not detected at the indicated concentration.

J = Estimated value.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

\* When no criteria were available from NJDEP, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-9**  
**Metals in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in):	SED-05-C/0-6	SED-04-A/0-6	SED-04-A/39-45	SED-04-B/0-6	SED-04-C/0-6	SED-03-A/0-6	SED-03-B/0-6	SED-03-C/0-6	SED-03-C/12-18
Date Sampled:	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02
Lab Sample No.:	3967855	3967911	3967913	3967915	3967917	3967919	3967857	3967921	3967922
Laboratory:	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

TAL-Metals (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Woodbridge Creek											
Aluminum	Al	(-)	(-)	21400	7570	13200	5860	23400	21200	6110	19000	21600			
Antimony	Sb	2*	25*	1.8 U	1.1 U	2.9 J	0.87 U	1.6 U	1.6 U	1.3 U	2.9 J	1.8 J			
Arsenic	As	8.2	70	34.4	9.4	43.6	8.0	8.6	52.4	16.8	65.7	91.7			
Barium	Ba	(-)	(-)	129	43.7	96.4	24.9	51.9	181	32.6	128	272			
Beryllium	Be	(-)	(-)	1.6	0.69 J	1.2	0.61 J	1.2	1.5	0.85 J	1.4	2.0			
Cadmium	Cd	1.2	9.6	2.8 J	2.0 J	3.0 J	1.2 J	1.4 J	13.0	0.91 J	11.1	8.2			
Calcium	Ca	(-)	(-)	4090	2490	1950	1910	2030	3110	2850	3420	3590			
Chromium, Total	Cr	81	370	97.5	34.0	46.4	20.5	43.4	128	34.7	142	166			
Cobalt	Co	(-)	(-)	85.9	9.0	23.5	6.3	10.4 J	51.0	16.0	13.2	13.2			
Copper	Cu	34	270	8030	313	322	313	17.7	2210	629	664	601			
Iron	Fe	(-)	(-)	35000	15800	28400	14900	32500	29100	22600	32100	36800			
Lead	Pb	47	218	378	113	393	68.1	13.5	244	166	381	399			
Magnesium	Mg	(-)	(-)	7120	2950	3500	2630	8440	6210	3250	6140	7090			
Manganese	Mn	(-)	(-)	322	119	254	83.0	281	177	112	218	277			
Mercury	Hg	0.15	0.71	2.0	0.49	1.7	0.18	0.030 J	3.2	0.42	4.1	5.8			
Nickel	Ni	21	52	2480	64.2	63.4	55.4	28.6	627	125	96.2	53.0			
Potassium	K	(-)	(-)	3790	1260	1630	905	5380	2730	1170	2760	3310			
Selenium	Se	(-)	(-)	5.2	15.5	6.5	12.7	1.7 J	88.1	43.1	38.0	7.1			
Silver	Ag	1	3.7	5.4	0.85 J	1.5 J	0.58 J	0.23 U	4.2 J	1.1 J	4.1 J	3.9 J			
Sodium	Na	(-)	(-)	10400	3550	4310	1910	8560	8560	6050	9320	8810			
Thallium	Tl	(-)	(-)	2.5 U	1.5 U	1.5 U	1.2 U	2.2 U	2.2 U	1.8 U	2.3 U	2.3 U			
Vanadium	V	(-)	(-)	66.0	31.5	54.6	22.6	56.2	73.2	37.6	95.5	62.5			
Zinc	Zn	150	410	2970	283	550	228	88.9	743	441	690	676			

U = The compound was not detected at the indicated concentration.

J = Estimated value.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(--) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

\* When no criteria were available from NJDEP, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-9**  
**Metals in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-03-C/30-36	SED-02-A/0-6	SED-02-B/0-6	SED-02-B/0-6(D)
Date Sampled: 12/19/02	12/20/02	12/20/02	12/20/02
Lab Sample No.: 3967923	3967892	3967889	3967890
Laboratory: Lancaster	Lancaster	Lancaster	Lancaster

TAL-Metals (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Woodbridge Creek				⇒				⇒				⇒				Arthur Kill
Aluminum	Al	(-)	(-)	25200	19200	6990	10200	19500	20900	12300	30400	24400	2.2	U	1.6	U	2.2	U		
Antimony	Sb	2*	25*	1.7	U	1.6	U	1	U	1.5	J	2.1	J	1.2	U	1.6	U	2.2	U	
Arsenic	As	8.2	70	39.2	23.1	9.9	10.9	54.4	32.1	17.3	63.0	46.7								
Barium	Ba	(-)	(-)	121	108	38.6	57.4	200	123	66.9	137	202								
Beryllium	Be	(-)	(-)	1.5	1.3	0.58	J	0.73	1.3	1.0	J	0.67	J	1.5		1.3	J			
Cadmium	Cd	1.2	9.6	2.6	J	3.7	J	1.1	J	1.2	J	9.5	3.7	J	1.8	J	2.7	J	5.9	J
Calcium	Ca	(-)	(-)	2160	4780	6910	12400	2960	2220	6430	2490	5740								
Chromium, Total	Cr	81	370	68.7	94.7	23.8	28.0	119	121	54.9	69.9	198								
Cobalt	Co	(-)	(-)	13.6	15.0	6.6	J	7.8	17.1	20.0	10.0	14.6	14.3	J						
Copper	Cu	34	270	121	564	213	172	763	758	424	210	587								
Iron	Fe	(-)	(-)	39000	32900	16400	20500	29900	37400	23000	43900	46900								
Lead	Pb	47	218	82.6	227	54.0	50.9	291	264	142	137	291								
Magnesium	Mg	(-)	(-)	8310	6700	3270	4310	6150	7520	4640	9190	9470								
Manganese	Mn	(-)	(-)	363	306	138	208	241	368	181	429	404								
Mercury	Hg	0.15	0.71	1.3	2.4	0.28	0.36	4.3	3.4	1.3	0.97	J	7.0							
Nickel	Ni	21	52	36.1	81.3	30.7	29.2	143	104	54.7	45.0	64.3								
Potassium	K	(-)	(-)	4500	3460	1410	2040	3150	4520	2460	5410	5930								
Selenium	Se	(-)	(-)	3.3	5.6	2.1	2.2	25.1	6.3	6.7	4.3	2.8	J							
Silver	Ag	1	3.7	1.3	J	3.7	J	0.53	J	0.49	J	4.1	4.9	J	1.5	J	1.3	J	7.9	
Sodium	Na	(-)	(-)	8130	9920	3270	3330	7420	13200	5840	8720	16300								
Thallium	Tl	(-)	(-)	2.3	U	2.3	J	1.4	U	1.4	U	1.9	J	3.2	J	1.7	U	2.1	U	
Vanadium	V	(-)	(-)	55.6	61.9	28.4	30.1	87.9	64.6	39.0	67.1	80.9								
Zinc	Zn	150	410	210	483	164	132	535	488	289	218	617								

U = The compound was not detected at the indicated concentration.

J = Estimated value.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(-) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

\* When no criteria were available from NJDEP, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-9**  
**Metals in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in):	SED-13-C/0-6	SED-13-C/0-6D	SED-14-C	SED-18-C	SED-15-C	SED-17-C	FB121902	FB122002
Date Sampled:	12/17/2002	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/19/02	12/20/2002
Lab Sample No.:	3964480	3964482	3964484	3964488	3964478	3964486	3967924	3967895
Laboratory:	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

TAL-Metals (ppm)	Abbrev.	ER-L <sup>(1)</sup>	ER-M <sup>(1)</sup>	Arthur Kill				Field Blanks (ppb)				
Aluminum	Al	(-)	(-)	25500	25000	25700	26000	30000	25300	47.7	U	
Antimony	Sb	2*	25*	2.1	U	1.9	U	2.1	U	1.8	J	
Arsenic	As	8.2	70	<b>29.5</b>	<b>29.1</b>	<b>28.9</b>	<b>28.3</b>	<b>35.8</b>	<b>107</b>	4.9	U	
Barium	Ba	(-)	(-)	142	136	143	151	192	245	0.44	U	
Beryllium	Be	(-)	(-)	1.3	J	1.3	J	1.3	J	1.3	U	
Cadmium	Cd	1.2	9.6	<b>2.4</b>	J	<b>2.3</b>	J	<b>2.6</b>	J	<b>2.4</b>	J	
Calcium	Ca	(-)	(-)	7850	7390	7780	8200	7890	5120	49.3	U	
Chromium, Total	Cr	81	370	<b>118</b>	<b>116</b>	<b>116</b>	<b>123</b>	<b>134</b>	<b>140</b>	2	U	
Cobalt	Co	(-)	(-)	14.2	J	13.7	J	14.0	J	15.1	J	
Copper	Cu	34	270	<b>265</b>	<b>265</b>	<b>271</b>	<b>257</b>	<b>302</b>	<b>413</b>	2.6	U	
Iron	Fe	(-)	(-)	43900	41900	43300	44700	48800	42500	34.9	U	
Lead	Pb	47	218	<b>201</b>	<b>194</b>	<b>198</b>	<b>207</b>	<b>230</b>	<b>322</b>	U	8.9	U
Magnesium	Mg	(-)	(-)	10400	9730	10300	10500	12200	8680	19.5	U	
Manganese	Mn	(-)	(-)	704	662	698	766	604	540	0.5	U	
Mercury	Hg	0.15	0.71	<b>2.4</b>	<b>2.7</b>	<b>2.4</b>	<b>2.5</b>	<b>3.2</b>	<b>2.6</b>	0.079	U	
Nickel	Ni	21	52	<b>46.6</b>	<b>45.1</b>	<b>47.5</b>	<b>47.3</b>	<b>52.3</b>	<b>59.7</b>	1.9	U	
Potassium	K	(-)	(-)	6100	6030	6480	6210	7650	5550	57.4	J	
Selenium	Se	(-)	(-)	3.4	1.2	U	1.5	J	1.9	J	54.7	J
Silver	Ag	1	3.7	<b>4.2</b>	J	<b>4.4</b>	J	<b>4.4</b>	J	<b>4.5</b>	J	
Sodium	Na	(-)	(-)	16400	14300	17000	15200	19400	9400	250	U	
Thallium	Tl	(-)	(-)	2.9	U	2.6	U	3	U	2	U	
Vanadium	V	(-)	(-)	67.6	65.7	67.0	69.9	77.4	58.7	1.7	U	
Zinc	Zn	150	410	<b>376</b>	<b>361</b>	<b>378</b>	<b>379</b>	<b>393</b>	<b>405</b>	4.9	U	

U = The compound was not detected at the indicated concentration.

J = Estimated value.

<sup>(1)</sup> New Jersey Sediment Screening Guidelines represent Effects Range-Low (ER-L) and Effects Range-Medium (ER-M) in Table 2 of NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

(-) = New Jersey Sediment Screening Guideline not listed in NJDEP's Nov. 1998 Guidance for Sediment Quality Evaluations.

\* When no criteria were available from NJDEP, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

Bold indicates concentration above the ER-L; bold and shaded indicates concentration above the ER-M.

ppm = parts per million.

**Table 9-10**  
**General Chemistry in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-11-C/0-6    SED-08-A/0-6    SED-08-C/0-6    SED-07-A/0-6    SED-07-B/0-6    SED-07-C/0-6    SED-10-A/0-6    SED-10-B/0-6    SED-10-C/0-6  
 Date Sampled: 12/20/02    12/20/02    12/20/02    12/20/02    12/20/02    12/20/02    12/19/02    12/19/02    12/19/02  
 Lab Sample No.: 3967899    3967903    3967885    3967897    3967859    3967901    3967871    3967873    3967862  
 Laboratory: Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster

General Chemistry - Parameter	Abbrev.	Flow Direction	⇒	Spa Spring Creek				⇒	⇒	Woodbridge Creek	⇒	
Total Organic Carbon (mg/kg)	TOC	41000		328000		260000		65000		188000		269000
pH	pH	6.16		6.8		6		6.8		7.14		6.39
Ammonia Nitrogen (mg/kg)	NH3	320	U	850	J	830		250	J	1900	U	550
Kjeldahl Nitrogen (mg/kg)	TKN	3000		15500		13400		4600		11000		10100
Nitrite Nitrogen (mg/kg)	Nitrite	2	U	6.5	U	3.8	U	2.4	U	5.4	U	5
Nitrate Nitrogen (mg/kg)	Nitrate	2	U	10.2	J	3.8	U	2.4	U	5.4	U	5
Total Organic Lead (mg/kg)	TOL	NA		16.1	U	9.6	U	NA		NA		NA

TRC Sample No./Depth Sampled (in): SED-09-A/0-6    SED-09-B/0-6    SED-09-C/0-6    SED-09-C/33-39    SED-06-A/0-6    SED-06-B/0-6    SED-06-C/0-6    SED-05-A/0-6    SED-05-B/0-6  
 Date Sampled: 12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02    12/19/02  
 Lab Sample No.: 3967877    3967869    3967864    3967865    3967875    3967879    3967867    3967907    3967909  
 Laboratory: Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster    Lancaster

General Chemistry - Parameter	Abbrev.	Woodbridge Creek	⇒	⇒	⇒	⇒	⇒	⇒	⇒			
Total Organic Carbon (mg/kg)	TOC	28200		11800		74000		110000		32700		5200
pH	pH	8.08		7.99		7.68		8.1		7.64		7.95
Ammonia Nitrogen (mg/kg)	NH3	230	U	1000	U	230	J	510		250	U	880
Kjeldahl Nitrogen (mg/kg)	TKN	1800		270	J	3300		3200		2500		260
Nitrite Nitrogen (mg/kg)	Nitrite	1.7	U	1.1	U	2.1	U	1.8	U	1.6	U	1
Nitrate Nitrogen (mg/kg)	Nitrate	1.7	U	1.1	U	2.1	U	1.8	U	1.6	U	3.1
Total Organic Lead (mg/kg)	TOL	NA		NA		NA		NA		4	U	2.6

NA = Not Analyzed

U = The compound was not detected at the indicated concentration.

J = Estimated value.

**Table 9-10**  
**General Chemistry in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-05-C/0-6	SED-04-A/0-6	SED-04-A/39-45	SED-04-B/0-6	SED-04-C/0-6	SED-03-A/0-6	SED-03-B/0-6	SED-03-C/0-6	SED-03-C/12-18
Date Sampled: 12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02
Lab Sample No.: 3967855	3967911	3967912	3967915	3967917	3967919	3967857	3967921	3967922
Laboratory: Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

General Chemistry - Parameter	Abbrev.	Woodbridge Creek											
Total Organic Carbon (mg/kg)	TOC	32000		24200		40500		7100		48600		48000	
pH	pH	8.12		8.46		8.02		8.08		7.41		8.4	
Ammonia Nitrogen (mg/kg)	NH3	230	J	310	U	400	U	940	U	200		220	
Kjeldahl Nitrogen (mg/kg)	TKN	2500		760	J	890		250	J	2600		1600	U
Nitrite Nitrogen (mg/kg)	Nitrite	2.1	U	1.3	U	1.3	U	1	U	1.9	U	1.9	U
Nitrate Nitrogen (mg/kg)	Nitrate	2.1	U	1.3	U	1.3	U	1	U	1.9	U	1.5	U
Total Organic Lead (mg/kg)	TOL	5.2	U	3.2	U	3.2	U	2.5	U	4.7	U	NA	NA
												NA	NA

TRC Sample No./Depth Sampled (in): SED-03-C/30-36	SED-02-A/0-6	SED-02-B/0-6	SED-02-B/0-6D	SED-02-C/0-6	SED-01-A/0-6	SED-01-B/0-6	SED-01-C/0-6	SED-16-C/0-6
Date Sampled: 12/19/02	12/20/02	12/20/02	12/20/02	12/20/02	12/20/02	12/20/02	12/20/02	12/17/02
Lab Sample No.: 3967923	3967892	3967889	3967890	3967894	3967881	3967883	3967905	3964485
Laboratory: Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

General Chemistry - Parameter	Abbrev.	Woodbridge Creek												Arthur Kill					
Total Organic Carbon (mg/kg)	TOC	47200		39000		45100		30900		43000		54000		31500		31100		49600	
pH	pH	7.8		7.97		8.05		7.96		8.28		7.12		7.73		7.42		8.02	
Ammonia Nitrogen (mg/kg)	NH3	730		210		600	U	150	U	224		230	J	510	U	190		370	
Kjeldahl Nitrogen (mg/kg)	TKN	2200		3000		560	J	400	J	1800		3800		1390		2200		3800	
Nitrite Nitrogen (mg/kg)	Nitrite	1.9	U	1.8	U	1.2	U	1.1	U	1.6	U	2.2	U	1.4	U	1.8	U	2.5	U
Nitrate Nitrogen (mg/kg)	Nitrate	1.9	U	1.8	U	1.2	U	1.1	U	1.6	U	2.2	U	1.4	U	1.8	U	2.5	U
Total Organic Lead (mg/kg)	TOL	NA		NA		NA		NA		NA		NA		NA		NA		NA	

NA = Not Analyzed

U = The compound was not detected at the indicated concentration.

J = Estimated value.

**Table 9-10**  
**General Chemistry in Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No./Depth Sampled (in): SED-13-C/0-6	SED-13-C/0-6D	SED-14-C/0-6	SED-18-C/0-6	SED-15-C/0-6	SED-17-C/0-6	FB121902	FB122002
Date Sampled: 12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/19/02	12/20/02
Lab Sample No.: 3964479&80	3964481&82	3964483&84	3964488	3964477&78	3964486	3967924	3967895
Laboratory: Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

General Chemistry - Parameter	Abbrev.	Arthur Kill						Field Blanks (ppb)			
Total Organic Carbon (mg/kg)	TOC	48700	49000	54000	51000	59000	39100	500	U	500	U
pH	pH	7.54	7.5	7.77	7.42	8.12	7.73	NA		NA	
Ammonia Nitrogen (mg/kg)	NH3	750	690	510	880	620	300	460	U	460	U
Kjeldahl Nitrogen (mg/kg)	TKN	4500	5000	4100	4400	4800	2450	300	U	300	U
Nitrite Nitrogen (mg/kg)	Nitrite	2.4	U	2.2	U	2.5	U	2.3	U	2.8	U
Nitrate Nitrogen (mg/kg)	Nitrate	4.5		2.2	J	2.5	U	2.3	U	2.8	U
Total Organic Lead (mg/kg)	TOL	6	U	5.4	U	6.2	U	NA		NA	
							NA			NA	

NA = Not Analyzed

U = The compound was not detected at the indicated concentration.

J = Estimated value.

**Table 9-11**  
**Particle Grain Size Analysis for Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

Sample No./Depth Sampled (in): SED-11-C/0-6	SED-08-A/0-6	SED-08-C/0-6	SED-07-A/0-6	SED-07-B/0-6	SED-07-C/0-6	SED-10-A/0-6	SED-10-B/0-6	SED-10-C/0-6
Date Sampled: 12/20/02	12/20/02	12/20/02	12/20/02	12/20/02	12/20/02	12/19/02	12/19/02	12/19/02
Lab Sample No.: 3967899	3967903	3967885	3967897	3967859	3967901	3967871	3967873	3967862
Laboratory: Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

Particle Grain Size Analysis (% Passing Sieve)	Flow Direction ➡			Spa Spring Creek ➡			Woodbridge Creek ➡		
	75 mm	37.5 mm	19 mm	4.75 mm	3.35 mm	2.36 mm	1.18 mm	0.6 mm	0.3 mm
75 mm	100	NA	NA	100	100	NA	100	100	100
37.5 mm	100	NA	NA	100	100	NA	100	100	100
19 mm	100	NA	NA	100	100	NA	91.5	98.5	100
4.75 mm	89.4	NA	NA	99.5	99.9	NA	79.7	90.4	85.5
3.35 mm	89.2	NA	NA	99.2	96.9	NA	76.1	85.2	77.8
2.36 mm	87.6	NA	NA	97.5	91.8	NA	70.8	77.6	68.2
1.18 mm	86.7	NA	NA	97.1	89.3	NA	50.9	56.2	56.2
0.6 mm	85.1	NA	NA	96.3	86.8	NA	18.7	30.7	37.5
0.3 mm	79.3	NA	NA	93.9	85	NA	3.1	9.6	11.8
0.15 mm	71.5	NA	NA	86	83.3	NA	1.9	3.3	2.6
0.075 mm	67.9	NA	NA	71.9	82.3	NA	1.7	2.7	2
0.064 mm	67	NA	NA	69	81.5	NA	2	2.5	2
0.05 mm	63	NA	NA	64.5	78	NA	2	2	2
0.02 mm	57	NA	NA	53	69	NA	1.5	1.5	2
0.005 mm	30	NA	NA	35	43	NA	0.5 U	0.5 U	0.5 U
0.002 mm	16.5	NA	NA	25	25.5	NA	0.5 U	0.5 U	0.5 U
0.001 mm	9	NA	NA	17	16	NA	0.5 U	0.5 U	0.5 U

NA = Not Available

U = The compound was not detected at the indicated concentration.

J = Estimated value.

**Table 9-11**  
**Particle Grain Size Analysis for Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

Sample No./Depth Sampled (in): SED-09-A/0-6	SED-09-B/0-6	SED-09-C/0-6	SED-09-C/33-3	SED-06-A/0-6	SED-06-B/0-6	SED-06-C/0-6	SED-05-A/0-6	SED-05-B/0-6
Date Sampled: 12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02
Lab Sample No.: 3967877	3967869	3967864	3967865	3967875	3967879	3967867	3967907	3967909
Laboratory: Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

Particle Grain Size Analysis (% Passing Sieve)	Woodbridge Creek									
	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
75 mm	100	100	100	100	NA	100	100	100	100	100
37.5 mm	100	100	100	100	NA	100	100	100	100	100
19 mm	100	100	100	100	NA	100	100	100	100	84.1
4.75 mm	99.9	99.4	99.4	99.8	NA	93	99.9	98.8	98.8	56.8
3.35 mm	98.5	99.2	99.3	99.6	NA	89	99.8	97.8	97.8	52.8
2.36 mm	93	98.6	99	98.7	NA	81.5	99.6	95.3	95.3	48.9
1.18 mm	92.5	97.5	97.7	94.5	NA	65.9	98.9	92.4	92.4	44.1
0.6 mm	91.4	92.6	96	89.8	NA	32.5	97.7	79.8	79.8	33.7
0.3 mm	89.4	70.1	93.5	86.8	NA	8	94.9	34.6	34.6	20.4
0.15 mm	79.4	22.9	85.3	79.2	NA	5.1	60.2	10.3	10.3	10.4
0.075 mm	74.2	12.7	65.3	63.9	NA	4.2	23.3	7.6	7.6	3.7
0.064 mm	73	12	60.5	62	NA	4.5	19.5	7.5	7.5	3
0.05 mm	71	11.5	54	58	NA	4	17	6	6	2.5
0.02 mm	64	9	42.5	48	NA	3.5	12	4	4	2
0.005 mm	38	2.5	22	11.5	NA	2	6.5	3	3	1
0.002 mm	23	0.5	13	9	NA	0.5 U	4	2.5	2.5	1
0.001 mm	14	0.5	10	8	NA	0.5 U	2	2.5	2.5	1

NA = Not Available

U = The compound was not detected at the indicated concentration.

J = Estimated value.

**Table 9-11**  
**Particle Grain Size Analysis for Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

Sample No./Depth Sampled (in): SED-05-C/0-6	SED-04-A/0-6	SED-04-A/39-4	SED-04-B/0-6	SED-04-C/0-6	SED-03-A/0-6	SED-03-B/0-6	SED-03-C/0-6	SED-03-C/12-1
Date Sampled: 12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02	12/19/02
Lab Sample No.: 3967855	3967911	3967912	3967915	3967917	3967919	3967857	3967921	3967922
Laboratory: Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

Particle Grain Size Analysis (% Passing Sieve)	Woodbridge Creek									
	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒
75 mm	100	100	100	100	100	100	100	100	100	100
37.5 mm	100	100	100	100	100	100	100	100	100	100
19 mm	100	100	100	100	100	100	100	100	100	100
4.75 mm	100	99.7	100	99.4	100	99.4	98.5	100	99.8	
3.35 mm	99.8	99.7	99.8	98	98.8	99.2	97	98.9	98.4	
2.36 mm	96.6	99.5	98.8	96.2	93.5	97.3	94.7	93.8	92	
1.18 mm	91.5	99.1	97.7	91.5	92.8	96.1	92.2	88.2	87.3	
0.6 mm	85.3	98.1	91.1	81.6	91.4	94.5	85.3	83.3	82.6	
0.3 mm	81.6	95.7	71.8	53.1	89.6	93.2	55.3	80.2	81	
0.15 mm	78.7	66.9	65.7	16.3	87.4	88.4	12	75.8	80.1	
0.075 mm	74.2	34.5	59.2	10.2	84.9	73.5	6.8	68.3	78.7	
0.064 mm	72	30	58	9.5	84	69.5	7	66	76	
0.05 mm	66.5	26	55.5	8	82	60	8	62	69	
0.02 mm	55	19	46	6	70	39	6	47	42	
0.005 mm	23	11	29	3	37.5	28.5	3.5	13.5	16	
0.002 mm	14	6	19.5	2	23	12.5	3.5	9	9.5	
0.001 mm	12	4	13	0.5	15.5	10	3.5	6.5	6	

NA = Not Available

U = The compound was not detected at the indicated concentration.

J = Estimated value.

**Table 9-11**  
**Particle Grain Size Analysis for Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

Sample No./Depth Sampled (in): SED-03-C/30-3	SED-02-A/0-6	SED-02-B/0-6	SED-02-B/0-6D	SED-02-C/0-6	SED-01-A/0-6	SED-01-B/0-6	SED-01-C/0-6	SED-16-C/0-6
Date Sampled: 12/19/02	12/20/02	12/20/02	12/20/02	12/20/02	12/20/02	12/20/02	12/20/02	12/17/02
Lab Sample No.: 3967923	3967892	3967889	3967890	3967894	3967881	3967883	3967905	3964485
Laboratory: Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

Particle Grain Size Analysis (% Passing Sieve)	Woodbridge Creek								Arthur Kill
	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	
75 mm	100	100	100	100	100	100	100	100	100
37.5 mm	100	100	100	100	100	100	100	100	100
19 mm	100	100	97.8	100	100	98.4	100	100	100
4.75 mm	100	99.3	92.1	96.8	98.6	97	99.4	100	99.7
3.35 mm	97.3	99	91.5	95.7	98.2	96.5	99	99.8	96.1
2.36 mm	84.1	97.4	90	92.6	97.2	94.5	97.9	93.5	83.9
1.18 mm	84	96.6	87.9	89.9	95.8	91.5	97	92.6	78.4
0.6 mm	83.8	95.4	83.9	85.4	93.4	88.2	94.4	90.5	71.7
0.3 mm	83.6	93	63.7	64.4	88.4	84.1	85.4	89.1	68.5
0.15 mm	83.1	74.3	45.3	33.5	77.3	78.9	42.5	88.1	66.4
0.075 mm	82.5	54.3	43	30.2	64.8	69.4	28	86.8	64.1
0.064 mm	82	52	42	29	61	65.5	27	85	60
0.05 mm	79	48	39	26.5	53	58	25.5	80	51
0.02 mm	72.5	38.5	23	27.5	38	44	18	79.5	31
0.005 mm	43	14	9.5	7	14.5	16.5	9	44	12
0.002 mm	30	9.5	6	4.5	9.5	11	4.5	28	9
0.001 mm	22.5	8.5	5	4.5	9	7.5	1	20	7

NA = Not Available

U = The compound was not detected at the indicated concentration.

J = Estimated value.

**Table 9-11**  
**Particle Grain Size Analysis for Sediment Samples**  
**Chevron Perth Amboy, New Jersey**

Sample No./Depth Sampled (in): SED-13-C/0-6	SED-13-C/0-6C	SED-14-C/0-6	SED-18-C/0-6	SED-15-C/0-6	SED-17-C/0-6
Date Sampled: 12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02
Lab Sample No.: 3964479&80	3964481&82	3964483&84	3964488	3964477&78	3964486
Laboratory: Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

Particle Grain Size Analysis (% Passing Sieve)	Arthur Kill					
	75 mm	37.5 mm	19 mm	4.75 mm	3.35 mm	2.36 mm
75 mm	100	100	100	100	100	100
37.5 mm	100	100	100	100	100	100
19 mm	100	100	100	100	100	100
4.75 mm	99.9	99.9	99.9	99.7	97.2	99.7
3.35 mm	94.8	95.9	98.9	97.2	99.7	96.6
2.36 mm	81.9	84.1	91.4	86.9	90.9	84.5
1.18 mm	78.8	81.1	85.8	84.4	89.4	83.9
0.6 mm	74.1	76.4	79.6	80.6	85.5	83.1
0.3 mm	71	72.9	76	78.8	82.6	82.4
0.15 mm	69.3	70.8	73.5	77.7	80.5	81.8
0.075 mm	67.9	68.8	70.6	76.5	78.3	80
0.064 mm	64	65	67.5	74	76	78
0.05 mm	54	56.5	59	69	72	72
0.02 mm	38	41.5	45	52	55	54
0.005 mm	16.5	19	19	26	23	32
0.002 mm	11	11	13	15	15	18
0.001 mm	9	7	9	8.5	9.5	11

NA = Not Available

U = The compound was not detected at the indicated concentration.

J = Estimated value.

**Surface Water Samples Tables 9-12 — 9-15**

**Table 9-12**  
**TCL Volatile Organic Compounds in Surface Water**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No.:	SW-11-C	SW-8-C	SW-7-C	SW-10-C	SW-9-C	SW-6-C	SW-5-C	SW-4-C	SW-3-C
Date Sampled:	12/18/02	12/18/02	12/18/02	12/19/02	12/18/02	12/18/02	12/18/02	12/18/02	12/18/02
Lab Sample No.:	3965749	3965750	3965751	3966062	3965777	3965748	3965747	3965746	3965745
Laboratory:	Lancaster								

VOCs (ppb)	Abbrev.	Acute SWQC <sup>(1)</sup>	Chronic SWQC <sup>(1)</sup>	Flow Direction	⇒	Spa Spring Creek	Woodbridge Creek	⇒	⇒	⇒	
Methyl t-butyl ether	MTBE	--	--	2.00 J	2.00 J	2.00 J	3.00 J	2.00 J	2.00 J	1.00 J	2.00 J
Chloromethane	CM	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Vinyl Chloride	VC	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromomethane	BM	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chloroethane	CE	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1-Dichloroethene	1,1-DCE	--	--	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U
Methylene Chloride	MC	12000*	6400*	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
trans-1,2-Dichloroethene	t-1,2-DCE	224000*	--	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U
1,1-Dichloroethane	1,1-DCA	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
cis-1,2-Dichloroethene	c-1,2-DCE	224000*	--	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U
Chloroform	Chloroform	--	--	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U
1,1,1-Trichloroethane	1,1,1-TCA	31200*	--	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U
Carbon Tetrachloride	CT	50000*	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzene	Benzene	5100*	700*	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
1,2-Dichloroethane	1,2-DCA	113000*	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Trichloroethene	TCE	2000*	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichloropropane	1,2-DCP	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromodichloromethane	BDCM	12000*	6400*	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Toluene	Toluene	6300*	5000*	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U	0.70 U
1,1,2-Trichloroethane	1,1,2-TCA	--	--	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U
Tetrachloroethene	PCE	10200*	450*	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U
Dibromochemical	DBCM	12000*	6400*	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chlorobenzene	CB	160*	129*	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U
Ethylbenzene	EB	430*	--	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U
Styrene	Styrene	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bromoform	Bromoform	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1,2,2-Tetrachloroethane	1,1,2,2-PCA	9020*	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Acetone	Acetone	--	--	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U	6.00 U
Carbon Disulfide	CDS	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2-Butanone	MEK	--	--	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U
trans-1,3-Dichloropropene	t-1,3-DCP	790*	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
cis-1,3-Dichloropropene	c-1,3-DCP	790*	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
4-Methyl-2-pentanone	MBK	--	--	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U
2-Hexanone	2-Hex	--	--	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U
Xylene (Total)	Xylene	--	--	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U	0.80 U
Cyclohexane	CH	--	--	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Methyl Acetate	MA	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Methylcyclohexane	MCH	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dichlorodifluoromethane	DDCFM	12000*	6400*	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Trichlorofluoromethane	TCFM	12000*	6400*	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
1,2-Dibromoethane	1,2 DBE	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Isopropylbenzene	IPB	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,3-Dichlorobenzene	1,3-DCB	--	--	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,4-Dichlorobenzene	1,4-DCB	1970*	129*	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dichlorobenzene	1,2-DCB	1970*	129*	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,2-Dibromo-3-chloropropane	1,2-DB 3-CP	--	--	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
1,2,4-Trichlorobenzene	1,2,4-TCB	160*	129*	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Freon 113	Freon113	--	--	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Total Targeted VOCs				2 J	2 J	2 J	3 J	2 J	2 J	1 J	2 J
Total TICs				ND	ND	ND	ND	ND	ND	ND	ND
Total VOCs				2 J	2 J	2 J	3 J	2 J	2 J	1 J	2 J

U = The compound was not detected at the indicated concentration; J = An Estimated Value.

<sup>(1)</sup>The most stringent of either the NJDEP or EPA surface water quality criteria (SWQC) for saltwater were chosen for comparative use. Standards adapted from comparison of 40 CFR - Chapter I - Part 131, Section 131.36(b); (February 7, 2003) and New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B, April 17, 1998).

\* When no criteria were available from NJDEP or EPA, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

(--) = No applicable criteria available.

ND = not detected.

ppb = parts per billion.

**Table 9-12**  
**TCL Volatile Organic Compounds in Surface Water**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No.:	SW-2-C	SW-1-C	SW-16-C	SW-13-C	SW-14-C	SW-14-CD	SW-15-C	SW-17-C
Date Sampled:	12/18/02	12/18/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02
Lab Sample No.:	3965744	3965743	3964469	3964466	3964467	3964468	3964465	3964470
Laboratory:	Lancaster							

VOCs (ppb)	Abbrev.	Acute SWQC <sup>(1)</sup>	Chronic SWQC <sup>(1)</sup>	Woodbridge Creek		Arthur Kill												
Methyl t-butyl ether	MTBE	--	--	1.00	J	1.00	J	1.00	J	0.70	J	0.80	J	1.00	J	1.00	J	
Chloromethane	CM	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Vinyl Chloride	VC	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Bromomethane	BM	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Chloroethane	CE	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
1,1-Dichloroethene	1,1-DCE	--	--	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	
Methylene Chloride	MC	12000*	6400*	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	
trans-1,2-Dichloroethene	t,1,2-DCE	224000*	--	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	
1,1-Dichloroethane	1,1-DCA	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
cis-1,2-Dichloroethene	c,1,2-DCE	224000*	--	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	
Chloroform	Chloroform	--	--	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	
1,1,1-Trichloroethane	1,1,1-TCA	31200*	--	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	
Carbon Tetrachloride	CT	50000*	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Benzene	Benzene	5100*	700*	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	0.50	U	
1,2-Dichloroethane	1,2-DCA	113000*	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Trichloroethene	TCE	2000*	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
1,2-Dichloropropane	1,2-DCP	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Bromodichloromethane	BDCM	12000*	6400*	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Toluene	Toluene	6300*	5000*	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	0.70	U	
1,1,2-Trichloroethane	1,1,2-TCA	--	--	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	
Tetrachloroethene	PCE	10200*	450*	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	
Dibromochloromethane	DBCM	12000*	6400*	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Chlorobenzene	CB	160*	129*	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	
Ethylbenzene	EB	430*	--	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	
Styrene	Styrene	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Bromoform	Bromoform	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
1,1,2,2-Tetrachloroethane	1,1,2,2-PCA	9020*	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Acetone	Acetone	--	--	6.00	U	6.00	U	6.00	U	6.00	U	6.00	U	6.00	U	6.00	U	
Carbon Disulfide	CDS	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
2-Butanone	MEK	--	--	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	
trans-1,3-Dichloropropene	t,1,3-DCP	790*	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
cis-1,3-Dichloropropene	c,1,3-DCP	790*	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
4-Methyl-2-pentanone	MBK	--	--	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	
2-Hexanone	2-Hex	--	--	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	3.00	U	
Xylene (Total)	Xylene	--	--	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	0.80	U	
Cyclohexane	CH	--	--	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	
Methyl Acetate	MA	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Methylcyclohexane	MCH	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Dichlorodifluoromethane	DCDFM	12000*	6400*	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	
Trichlorofluoromethane	TCFM	12000*	6400*	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	
1,2-Dibromoethane	1,2 DBE	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Isopropylbenzene	IPB	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
1,3-Dichlorobenzene	1,3-DCB	--	--	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
1,4-Dichlorobenzene	1,4-DCB	1970*	129*	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
1,2-Dichlorobenzene	1,2-DCB	1970*	129*	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
1,2-Dibromo-3-chloropropane	1,2-DB 3-CP	--	--	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	
1,2,4-Trichlorobenzene	1,2,4-TCB	160*	129*	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	1.00	U	
Freon 113	Freon113	--	--	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	2.00	U	
Total Targeted VOCs				1 J		1 J		1 J		1 J		0.7 J		0.8 J		1 J		1 J
Total TICs				ND		ND		ND		ND		ND		ND		ND		ND
Total VOCs				1 J		1 J		1 J		1 J		0.7 J		0.8 J		1 J		1 J

U = The compound was not detected at the indicated concentration; J = An Estimated Value.

<sup>(1)</sup>The most stringent of either the NJDEP or EPA surface water quality criteria (SWQC) for saltwater were chosen for comparative use. Standards adapted from comparison of 40 CFR - Chapter I - Part 131, Section 131.36(b), (February 7, 2003) and New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B, April 17, 1998).

\* When no criteria were available from NJDEP or EPA, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

(--) = No applicable criteria available.

ND = not detected.

ppb = parts per billion.

**Table 9-12**  
**TCL Volatile Organic Compounds in Surface Water**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No.: FB121802      TB121802  
 Date Sampled: 12/18/02      12/18/02  
 Lab Sample No.: 3965752      3965753  
 Laboratory: Lancaster      Lancaster

VOCs (ppb)	Abbrev.	Acute SWQC <sup>(1)</sup>	Chronic SWQC <sup>(1)</sup>	Field Blank	Trip Blank
Methyl t-butyl ether	MTBE	--	--	0.50 U	0.50 U
Chloromethane	CM	--	--	1.00 U	1.00 U
Vinyl Chloride	VC	--	--	1.00 U	1.00 U
Bromomethane	BM	--	--	1.00 U	1.00 U
Chloroethane	CE	--	--	1.00 U	1.00 U
1,1-Dichloroethene	1,1-DCE	--	--	0.80 U	0.80 U
Methylene Chloride	MC	12000*	6400*	2.00 U	2.00 U
trans-1,2-Dichloroethene	t1,2-DCE	224000*	--	0.80 U	0.80 U
1,1-Dichloroethane	1,1-DCA	--	--	1.00 U	1.00 U
cis-1,2-Dichloroethene	c-1,2-DCE	224000*	--	0.80 U	0.80 U
Chloroform	Chloroform	--	--	0.80 U	0.80 U
1,1,1-Trichloroethane	1,1,1-TCA	31200*	--	0.80 U	0.80 U
Carbon Tetrachloride	CT	50000*	--	1.00 U	1.00 U
Benzene	Benzene	5100*	700*	0.50 U	0.50 U
1,2-Dichloroethane	1,2-DCA	113000*	--	1.00 U	1.00 U
Trichloroethene	TCE	2000*	--	1.00 U	1.00 U
1,2-Dichloropropane	1,2-DCP	--	--	1.00 U	1.00 U
Bromodichloromethane	BDCM	12000*	6400*	1.00 U	1.00 U
Toluene	Toluene	6300*	5000*	0.70 U	0.70 U
1,1,2-Trichloroethane	1,1,2-TCA	--	--	0.80 U	0.80 U
Tetrachloroethene	PCE	10200*	450*	0.80 U	0.80 U
Dibromochloromethane	DBCM	12000*	6400*	1.00 U	1.00 U
Chlorobenzene	CB	160*	129*	0.80 U	0.80 U
Ethylbenzene	EB	430*	--	0.80 U	0.80 U
Styrene	Styrene	--	--	1.00 U	1.00 U
Bromoform	Bromoform	--	--	1.00 U	1.00 U
1,1,2,2-Tetrachloroethane	1,1,2,2-PCA	9020*	--	1.00 U	1.00 U
Acetone	Acetone	--	--	6.00 U	6.00 U
Carbon Disulfide	CDS	--	--	1.00 U	1.00 U
2-Butanone	MEK	--	--	3.00 U	3.00 U
trans-1,3-Dichloropropene	t-1,3-DCP	790*	--	1.00 U	1.00 U
cis-1,3-Dichloropropene	c-1,3-DCP	790*	--	1.00 U	1.00 U
4-Methyl-2-pentanone	MBK	--	--	3.00 U	3.00 U
2-Hexanone	2-Hex	--	--	3.00 U	3.00 U
Xylene (Total)	Xylene	--	--	0.80 U	0.80 U
Cyclohexane	CH	--	--	3.00 J	2.00 U
Methyl Acetate	MA	--	--	1.00 U	1.00 U
Methylcyclohexane	MCH	--	--	1.00 U	1.00 U
Dichlorodifluoromethane	DCDFM	12000*	6400*	2.00 U	2.00 U
Trichlorodifluoromethane	TCFM	12000*	6400*	2.00 U	2.00 U
1,2-Dibromoethane	1,2 DBE	--	--	1.00 U	1.00 U
Isopropylbenzene	IPB	--	--	1.00 U	1.00 U
1,3-Dichlorobenzene	1,3-DCB	--	--	1.00 U	1.00 U
1,4-Dichlorobenzene	1,4-DCB	1970*	129*	1.00 U	1.00 U
1,2-Dichlorobenzene	1,2-DCB	1970*	129*	1.00 U	1.00 U
1,2-Dibromo-3-chloropropane	1,2-DB 3-CP	--	--	2.00 U	2.00 U
1,2,4-Trichlorobenzene	1,2,4-TCB	160*	129*	1.00 U	1.00 U
Freon 113	Freon113	--	--	2.00 U	2.00 U
Total Targeted VOCs			3 J	ND	
Total TICs			ND	ND	
Total VOCs			3 J	ND	

U = The compound was not detected at the indicated concentration; J = An Estimated Value.

<sup>(1)</sup>The most stringent of either the NJDEP or EPA surface water quality criteria (SWQC) for saltwater were chosen for comparative use. Standards adapted from comparison of 40 CFR - Chapter I - Part 131, Section 131.36(b); (February 7, 2003) and New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B, April 17, 1998).

\* When no criteria were available from NJDEP or EPA, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

(--) = No applicable criteria available.

ND = not detected.

ppb = parts per billion.

**Table 9-13**  
**TCL Semi-Volatile Organic Compounds in Surface Water**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No.:	SW-11-C	SW-8-C	SW-7-C	SW-10-C	SW-9-C	SW-6-C	SW-5-C	SW-4-C	SW-3-C
Date Sampled:	12/18/02	12/18/02	12/18/02	12/19/02	12/18/02	12/18/02	12/18/02	12/18/02	12/18/02
Lab Sample No.:	3965749	3965750	3965751	3966062	3965777	3965748	3965747	3965746	3965745
Laboratory:	Lancaster								

SVOCs (ppb)	Abbrev.	Acute SWQC <sup>(1)</sup>	Chronic SWQC <sup>(1)</sup>	Flow Direction	Spa Spring Creek			Woodbridge Creek			⇒			⇒			
					↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	
4-Chloroaniline	4-CLA	160*	129*		1.00 U	1.00 U	1.00 U		1.00 U								
2-Methylnaphthalene	2-MNap	300	--		1.00 U	1.00 U	1.00 U		1.00 U								
2-Nitroaniline	2-NA	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
2,4,5-Trichlorophenol	2,4,5-TCP	240*	11*		1.00 U	1.00 U	1.00 U		1.00 U								
2-Chlorophenol	2-CP	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
Phenol	Phenol	5800*	--		1.00 U	1.00 U	1.00 U		1.00 U								
2-Nitrophenol	2-NP	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
2,4-Dimethylphenol	2,4-DMP	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
2,4-Dichlorophenol	2,4-DCP	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
4-Chloro-3-methylphenol	4-C-3-MP	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
2,4,6-Trichlorophenol	2,4,6-TCP	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
bis(2-Chloroethyl)ether	b(2-c)E	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
Hexachloroethane	HCE	940*	--		1.00 U	1.00 U	1.00 U		1.00 U								
N-Nitroso-di-n-propylamine	NDPA	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
Nitrobenzene	Nitrobenzene	6680*	--		1.00 U	1.00 U	1.00 U		1.00 U								
Isophorone	IP	12900*	--		1.00 U	1.00 U	1.00 U		1.00 U								
bis(2-Chloroethoxy)methane	b(2-c)M	12000*	6400*		1.00 U	1.00 U	1.00 U		1.00 U								
Naphthalene	Naphthalene	2350*	--		1.00 U	1.00 U	1.00 U		1.00 U								
Hexachlorobutadiene	HCBD	32*	--		1.00 U	1.00 U	1.00 U		1.00 U								
Hexachlorocyclopentadiene	HCCPD	7*	--		5.00 U	5.00 U	5.00 U		5.00 U								
2-Chloronaphthalene	2-CNP	7.5*	--		1.00 U	1.00 U	1.00 U		1.00 U								
Acenaphthylene	ACPL	300*	--		1.00 U	1.00 U	1.00 U		1.00 U								
Dimethylphthalate	DMP	2944*	3.4*		2.00 U	2.00 U	2.00 U		2.00 U								
2-Methylphenol	2-MP	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
4-Methylphenol	4-MP	--	--		2.00 U	2.00 U	2.00 U		2.00 U								
Atrazine	Atrazine	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
Caprolactam	Caprolactam	--	--		5.00 U	5.00 U	5.00 U		5.00 U								
Benzaldehyde	Benzald	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
Dibenzofuran	DBF	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
3-Nitroaniline	3-NA	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
4-Nitroaniline	4-NA	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
2,4-Dinitrophenol	2,4-DNP	4850*	--		20.00 U	19.00 U	20.00 U		19.00 U								
4-Nitrophenol	4-NP	4850*	--		10.00 U	10.00 U	10.00 U		10.00 U								
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	--	--		5.00 U	5.00 U	5.00 U		5.00 U								
Pentachlorophenol	PCP	13	7.9		3.00 U	3.00 U	3.00 U		3.00 U								
2,6-Dinitrotoluene	2,6-DNT	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
Acenaphthene	ACP	970*	710*		1.00 U	1.00 U	1.00 U		1.00 U								
2,4-Dinitrotoluene	2,4-DNT	590*	370*		1.00 U	1.00 U	1.00 U		1.00 U								
Fluorene	Fluorene	300*	--		1.00 U	1.00 U	1.00 U		1.00 U								
4-Chlorophenyl-phenylether	4-CPPE	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
Diethylphthalate	DEP	2944*	3.4*		2.00 U	2.00 U	2.00 U		2.00 U								
N-Nitrosodiphenylamine	NDPhA	330000*	--		2.00 U	2.00 U	2.00 U		2.00 U								
4-Bromophenyl-phenylether	4-BPPE	--	--		1.00 U	1.00 U	1.00 U		1.00 U								
Hexachlorobenzene	HCB	160*	129*		1.00 U	1.00 U	1.00 U		1.00 U								
Phenanthrene	PhA	7.7*	4.6*		1.00 U	1.00 U	1.00 U		1.00 U								
Anthracene	ANT	300*	--		1.00 U	1.00 U	1.00 U		1.00 U								
Di-n-butylphthalate	DBP	2944*	3.4*		2.00 U	2.00 U	2.00 U		2.00 U								
Fluoranthene	Fluoranthene	40*	16*		1.00 U	1.00 U	1.00 U		1.00 U								

U = The compound was not detected at the indicated concentration.

J = An Estimated Value; ND = not detected.

B = Analyte Detected in Field Blank.

\*JB = Only part of the Total TIC concentration can be attributed to specific compound(s) detected in the Field Blank.

<sup>(1)</sup>The most stringent of either the NJDEP or EPA surface water quality criteria (SWQC) for saltwater were chosen for comparative use. Standards adapted from comparison of 40 CFR - Chapter I - Part 131, Section 131.36(b); (February 7, 2003) and New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B, April 17, 1998).

\* When no criteria were available from NJDEP or EPA, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

(-) = No applicable criteria available.

ppb = parts per billion.

**Table 9-13**  
**TCL Semi-Volatile Organic Compounds in Surface Water**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No.:	SW-11-C	SW-8-C	SW-7-C	SW-10-C	SW-9-C	SW-6-C	SW-5-C	SW-4-C	SW-3-C
Date Sampled:	12/18/02	12/18/02	12/18/02	12/19/02	12/18/02	12/18/02	12/18/02	12/18/02	12/18/02
Lab Sample No.:	3965749	3965750	3965751	3966062	3965777	3965748	3965747	3965746	3965745
Laboratory:	Lancaster								

SVOCs (ppb)	Abbrev.	Acute SWQC <sup>(1)</sup>	Chronic SWQC <sup>(1)</sup>	Flow Direction	Spa Spring Creek			Woodbridge Creek								
					⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒
Pyrene	Pyrene	300*	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Butylbenzylphthalate	BBP	2944*	3.4*		2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Benzo(a)anthracene	B(a)A	300*	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chrysene	Chrysene	300*	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
3,3'-Dichlorobenzidine	3,3'-DCBd	--	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
bis(2-Ethylhexyl)phthalate	B(2-EH)P	400*	360*		2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Di-n-octylphthalate	DOP	2944*	3.4*		2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Benzo(b)fluoranthene	B(b)F	300*	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzo(k)fluoranthene	B(k)F	300*	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzo(a)pyrene	B(a)P	300*	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	300*	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dibenz(a,h)anthracene	DB(a,h)a	300*	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzo(g,h,i)perylene	B(g,h,i)P	300*	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Carbazole	Carbazole	--	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1'-Biphenyl	1,1-BP	--	--		1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Acetophenone	Acetophen	--	--		2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Total Targeted SVOCs					ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total TICs					6 JB	ND	17 *JB	17 *JB	7 JB	4 JB	9 JB	6 JB	4 JB	4 JB	4 JB	4 JB
Total SVOCs					6 JB	ND	17 *JB	17 *JB	7 JB	4 JB	9 JB	6 JB	4 JB	4 JB	4 JB	4 JB

U = The compound was not detected at the indicated concentration.

J = An Estimated Value; ND = not detected.

B = Analyte Detected in Field Blank.

\*JB = Only part of the Total TIC concentration can be attributed to specific compound(s) detected in the Field Blank.

<sup>(1)</sup>The most stringent of either the NJDEP or EPA surface water quality criteria (SWQC) for saltwater were chosen for comparative use. Standards adapted from comparison of 40 CFR - Chapter I - Part 131, Section 131.36(b); (February 7, 2003) and New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B, April 17, 1998).

\* When no criteria were available from NJDEP or EPA, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

(--) = No applicable criteria available.

ppb = parts per billion.

**Table 9-13**  
**TCL Semi-Volatile Organic Compounds in Surface Water**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No.:	SW-2-C	SW-1-C	SW-16-C	SW-13-C	SW-14-C	SW-14-CD	SW-15-C	SW-17-C	FB121802
Date Sampled:	12/18/02	12/18/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/18/02
Lab Sample No.:	3965744	3965743	3964469	3964466	3964467	3964468	3964465	3964470	3965752
Laboratory:	Lancaster								

SVOCS (ppb)	Abbrev.	Acute SWQC <sup>(1)</sup>	Chronic SWQC <sup>(1)</sup>	Woodbridge Creek	⇒	Arthur Kill	⇒	⇒	⇒	⇒	⇒	Field Blank
4-Chloroaniline	4-CLA	160*	129*	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2-Methylnaphthalene	2-MNap	300	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2-Nitroaniline	2-NA	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,4,5-Trichlorophenol	2,4,5-TCP	240*	11*	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2-Chlorophenol	2-CP	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Phenol	Phenol	5800*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2-Nitrophenol	2-NP	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,4-Dimethylphenol	2,4-DMP	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,4-Dichlorophenol	2,4-DCP	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
4-Chloro-3-methylphenol	4-C-3-MP	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,4,6-Trichlorophenol	2,4,6-TCP	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
bis(2-Chloroethyl)ether	b(2-c)E	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Hexachloroethane	HCE	940*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
N-Nitroso-di-n-propylamine	NDPA	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Nitrobenzene	Nitrobenzene	6680*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Isophorone	IP	12900*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
bis(2-Chloroethoxy)methane	b(2-c)M	12000*	6400*	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Naphthalene	Naphthalene	2350*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Hexachlorobutadiene	HCBD	32*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Hexachlorocyclopentadiene	HCCPD	7*	--	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
2-Chloronaphthalene	2-CNP	7.5*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Acenaphthylene	ACPL	300*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dimethylphthalate	DMP	2944*	3.4*	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
2-Methylphenol	2-MP	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,2'-oxybis(1-Chloropropane)	2,2-OB-1-CP	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
4-Methylphenol	4-MP	--	--	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Atrazine	Atrazine	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Caprolactam	Caprolactam	--	--	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Benzaldehyde	Benzald	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dibenzofuran	DBF	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
3-Nitroaniline	3-NA	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
4-Nitroaniline	4-NA	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,4-Dinitrophenol	2,4-DNP	4850*	--	19.00 U	19.00 U	19.00 U	19.00 U	19.00 U	19.00 U	19.00 U	19.00 U	19.00 U
4-Nitrophenol	4-NP	4850*	--	10.00 U	10.00 U	9.00 U	10.00 U	10.00 U	10.00 U	10.00 U	10.00 U	10.00 U
4,6-Dinitro-2-methylphenol	4,6-DN-2-MP	--	--	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U	5.00 U
Pentachlorophenol	PCP	13	7.9	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U	3.00 U
2,6-Dinitrotoluene	2,6-DNT	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Acenaphthene	ACP	970*	710*	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
2,4-Dinitrotoluene	2,4-DNT	590*	370*	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Fluorene	Fluorene	300*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
4-Chlorophenyl-phenylether	4-CPPE	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Diethylphthalate	DEP	2944*	3.4*	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
N-Nitrosodiphenylamine	NDPhA	330000*	--	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
4-Bromophenyl-phenylether	4-BPPE	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Hexachlorobenzene	HCB	160*	129*	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Phenanthrene	PhA	7.7*	4.6*	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Anthracene	ANT	300*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Di-n-butylphthalate	DBP	2944*	3.4*	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Fluoranthene	Fluoranthene	40*	16*	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U

U = The compound was not detected at the indicated concentration.

J = An Estimated Value; ND = not detected.

B = Analyte Detected in Field Blank.

\*JB = Only part of the Total TIC concentration can be attributed to specific compound(s) detected in the Field Blank.

(1) The most stringent of either the NJDEP or EPA surface water quality criteria (SWQC) for saltwater were chosen for comparative use. Standards adapted from comparison of 40 CFR - Chapter I - Part 131, Section 131.36(b); (February 7, 2003) and New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B, April 17, 1998).

\* When no criteria were available from NJDEP or EPA, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

(-) = No applicable criteria available.

ppb = parts per billion.

**Table 9-13**  
**TCL Semi-Volatile Organic Compounds in Surface Water**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No.:	SW-2-C	SW-1-C	SW-16-C	SW-13-C	SW-14-C	SW-14-CD	SW-15-C	SW-17-C	FB121802
Date Sampled:	12/18/02	12/18/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/18/02
Lab Sample No.:	3965744	3965743	3964469	3964466	3964467	3964468	3964465	3964470	3965752
Laboratory:	Lancaster								

SVOCs (ppb)	Abbrev.	Acute SWQC <sup>(1)</sup>	Chronic SWQC <sup>(1)</sup>	Woodbridge Creek		⇒		Arthur Kill		⇒		⇒		⇒		Field Blank
				Woodbridge Creek	Arthur Kill	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒
Pyrene	Pyrene	300*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Butylbenzylphthalate	BBP	2944*	3.4*	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Benzo(a)anthracene	B(a)A	300*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Chrysene	Chrysene	300*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
3,3'-Dichlorobenzidine	3,3'-DCBd	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Bis(2-Ethylhexyl)phthalate	B(2-EH)P	400*	360*	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Di-n-octylphthalate	DOP	2944*	3.4*	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Benzo(b)fluoranthene	B(b)F	300*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzo(k)fluoranthene	B(k)F	300*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzo(a)pyrene	B(a)P	300*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Indeno(1,2,3-cd)pyrene	I(1,2,3-cd)P	300*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Dibenz(a,h)anthracene	DB(a,h)a	300*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Benzo(g,h,i)perylene	B(g,h,i)P	300*	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Carbazole	Carbazole	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
1,1'-Biphenyl	1,1-BP	--	--	1.00 U	1.00 U	0.90 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Acetophenone	Acetophen	--	--	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U	2.00 U
Total Targeted SVOCs				ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total TICs					5 JB	6 JB	5 JB	5 JB	5 JB	6 JB	32 *JB	5 JB	5 JB	6 JB	32 *JB	5 JB
Total SVOCs					5 JB	6 JB	5 JB	5 JB	5 JB	6 JB	32 *JB	5 JB	5 JB	6 JB	32 *JB	5 JB

U = The compound was not detected at the indicated concentration.

J = An Estimated Value; ND = not detected.

B = Analyte Detected in Field Blank.

\*JB = Only part of the Total TIC concentration can be attributed to specific compound(s) detected in the Field Blank.

<sup>(1)</sup>The most stringent of either the NJDEP or EPA surface water quality criteria (SWQC) for saltwater were chosen for comparative use. Standards adapted from comparison of 40 CFR - Chapter I - Part 131, Section 131.36(b); (February 7, 2003) and New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B, April 17, 1998).

\* When no criteria were available from NJDEP or EPA, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

(--) = No applicable criteria available.

ppb = parts per billion.

**Table 9-14**  
**Metals in Surface Water**  
**Chevron Perth Amboy, New Jersey**

TRC RAVIV Sample No.: SW-11-C (F)	SW-11-C (U)	SW-8-C (F)	SW-8-C (U)	SW-7-C (F)	SW-7-C (U)	SW-10-C (F)	SW-10-C (U)
Date Sampled: 12/18/02	12/18/02	12/18/02	12/18/02	12/18/02	12/18/02	12/19/02	12/19/02
Lab Sample No.: 3965773	3965749	3965774	3965750	3965775	3965751	3966063	3966062
Laboratory: Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

TAL-Metal (ppb)	Abbrev.	Chronic SWQC <sup>(1)</sup>	Acute SWQC <sup>(1)</sup>	Flow Direction → Spa Spring Creek → →								Woodbridge Creek →			
				Spa Spring Creek								Woodbridge Creek			
Aluminum	Al	--	--	47.7	U	322		47.7	U	159	J	47.7	U	292	
Antimony	Sb	500*	1500*	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U
Arsenic	As	36 <sup>(2)</sup>	69 <sup>(2)</sup>	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	J
Barium	Ba	--	--	91.2	J	108		51.4	J	54.8	J	49.6	J	55.0	J
Beryllium	Be	--	--	0.5	U	0.50	U	0.5	U	0.50	U	0.5	U	0.50	U
Cadmium	Cd	9.3 <sup>(2)</sup>	42 <sup>(2)</sup>	0.94	U	0.94	U	0.94	U	0.94	U	0.94	U	0.94	U
Calcium	Ca	--	--	64700		65400		60300		61100		64400		65700	
Chromium, Total (+6)	Cr	50 <sup>(2)</sup>	1,100 <sup>(2)</sup>	2	U	2.0	U	2	U	2.0	U	2	U	2	U
Cobalt	Co	--	--	21.2	J	23.4	J	29.4	J	27.8	J	28	J	27.0	J
Copper	Cu	5.6 <sup>(2)</sup>	7.9 <sup>(2)</sup>	2.6	U	3.6	J	2.6	U	2.6	U	2.6	U	5.4	J
Iron	Fe	--	--	5810		7630		2980		3910		2620		4050	
Lead	Pb	8.1 <sup>(2)</sup>	210 <sup>(2)</sup>	8.9	U	8.9	U	8.9	U	8.9	U	8.9	U	8.9	U
Magnesium	Mg	--	--	13900		14600		31800		32200		45600		46100	
Manganese	Mn	--	--	1290		1340		1500		1450		1460		1410	
Mercury	Hg	0.025 <sup>(3)</sup>	1.8 <sup>(2)</sup>	0.079	U	0.079	U	0.079	U	0.079	U	0.079	U	0.079	U
Nickel	Ni	8.2 <sup>(2)</sup>	74 <sup>(2)</sup>	<b>29.4</b>	J	30.9	J	<b>39</b>	J	37.7	J	<b>39.3</b>	J	37.1	J
Potassium	K	--	--	16900		16700		9610		9730		14900		15200	
Selenium	Se	71 <sup>(2)</sup>	290 <sup>(2)</sup>	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U
Silver	Ag	--	1.9	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
Sodium	Na	--	--	69200		73800		242000		241000		370000		352000	
Thallium	Tl	--	2130*	9.5	U	9.5	U	9.5	U	9.5	U	9.5	U	9.5	U
Vanadium	V	--	--	1.7	U	2.7	J	1.7	U	1.7	U	1.7	J	2.6	J
Zinc	Zn	81 <sup>(2)</sup>	90 <sup>(2)</sup>	75.7		103		<b>125</b>		129		<b>122</b>		134	

U = The compound was not detected at the indicated concentration.

J = An Estimated Value.

(U) = Denotes unfiltered sample (Total Recoverable)

(F) = Denotes filtered sample (Dissolved)

(+6) = Criterion for Chromium +6.

<sup>(1)</sup> The most stringent of either the NJDEP or EPA surface water quality criteria (SWQC) for saltwater were chosen for comparative use. Standards adapted from comparison of 40 CFR - Chapter I - Part 131,

Section 131.36(b); (February 7, 2003) and New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B, April 17, 1998).

<sup>(2)</sup> = Criteria apply to dissolved metal concentrations only per NJDEP's 2/28/03 SWQS memorandum.

<sup>(3)</sup>=Criteria apply to total recoverable metal concentrations only per NJDEP's 2/28/03 SWQS memorandum.

\* When no criteria were available from NJDEP or EPA, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

(--) = No applicable criteria available.

**Bold** indicates concentration above the Chronic SWQC.

**Bold and Shading** indicates concentration above Acute and Chronic SWQC.

**Table 9-14**  
**Metals in Surface Water**  
**Chevron Perth Amboy, New Jersey**

TRC RAVIV Sample No.:	SW-9-C (F)	SW-9-C (U)	SW-6-C (F)	SW-6-C (U)	SW-5-C (F)	SW-5-C (U)	SW-4-C (F)	SW-4-C (U)
Date Sampled:	12/18/02	12/18/02	12/18/02	12/18/02	12/18/02	12/18/02	12/18/02	12/18/02
Lab Sample No.:	3965778	3965777	3965772	3965748	3965771	3965747	3965770	3965746
Laboratory:	Lancaster							

TAL-Metal (ppb)	Abbrev.	Chronic SWQC <sup>(1)</sup>	Acute SWQC <sup>(1)</sup>	Woodbridge Creek								
				⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	
Aluminum	Al	--	--	47.7	U	436	47.7	U	424	47.7	U	323
Antimony	Sb	500*	1500*	9.9	U	9.9	U	9.9	U	9.9	U	9.9
Arsenic	As	36 <sup>(2)</sup>	69 <sup>(2)</sup>	4.9	U	4.9	U	4.9	U	4.9	U	4.9
Barium	Ba	--	--	47.5	J	49.2	J	32.4	J	39.0	J	28.8
Beryllium	Be	--	--	0.5	U	0.5	U	0.5	U	0.50	U	0.5
Cadmium	Cd	9.3 <sup>(2)</sup>	42 <sup>(2)</sup>	0.94	U	0.94	U	0.94	U	0.94	U	0.94
Calcium	Ca	--	--	84300		83600	143000		147000	168000		175000
Chromium, Total (+6)	Cr	50 <sup>(2)</sup>	1,100 <sup>(2)</sup>	2	U	2	U	2	U	2	U	2
Cobalt	Co	--	--	1.7	J	1.7	U	3	J	1.9	J	1.8
Copper	Cu	5.6 <sup>(2)</sup>	7.9 <sup>(2)</sup>	3.6	J	21.5	J	2.6	U	18.5	J	2.6
Iron	Fe	--	--	34.9	U	858		34.9	U	828		34.9
Lead	Pb	8.1 <sup>(2)</sup>	210 <sup>(2)</sup>	8.9	U	8.9	U	8.9	U	8.9	U	8.9
Magnesium	Mg	--	--	170000		169000		392000		397000		482000
Manganese	Mn	--	--	171		176		151		159		123
Mercury	Hg	0.025 <sup>(3)</sup>	1.8 <sup>(2)</sup>	0.079	U	0.079	U	0.079	U	0.079	U	0.079
Nickel	Ni	8.2 <sup>(2)</sup>	74 <sup>(2)</sup>	<b>32.6</b>	J	33.4	J	<b>41.2</b>	J	43.3	J	<b>34.5</b>
Potassium	K	--	--	58500		60200		141000		142000		182000
Selenium	Se	71 <sup>(2)</sup>	290 <sup>(2)</sup>	4.8	U	4.8	U	4.8	U	4.8	U	4.8
Silver	Ag	--	1.9	1.4	U	1.4	U	1.4	U	1.4	U	1.4
Sodium	Na	--	--	1400000		1440000		3270000		3230000		4040000
Thallium	Tl	--	2130*	9.5	U	9.5	U	9.5	U	9.5	U	9.5
Vanadium	V	--	--	1.7	U	1.7	U	2.1	J	3.2	J	1.7
Zinc	Zn	81 <sup>(2)</sup>	90 <sup>(2)</sup>	73.1		92.2		55.6		75.0		42.2

U = The compound was not detected at the indicated concentration.

J = An Estimated Value.

(U) = Denotes unfiltered sample (Total Recoverable)

(F) = Denotes filtered sample (Dissolved)

(+6) = Criterion for Chromium +6.

<sup>(1)</sup> The most stringent of either the NJDEP or EPA surface water quality criteria (SWQC) for saltwater were chosen for comparative use. Standards adapted from comparison of 40 CFR - Chapter I - Part 131, Section 131.36(b); (February 7, 2003) and New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B, April 17, 1998).

<sup>(2)</sup> = Criteria apply to dissolved metal concentrations only per NJDEP's 2/28/03 SWQS memorandum.

<sup>(3)</sup>=Criteria apply to total recoverable metal concentrations only per NJDEP's 2/28/03 SWQS memorandum.

\* When no criteria were available from NJDEP or EPA, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

(--) = No applicable criteria available.

**Bold** indicates concentration above the Chronic SWQC.

**Bold and Shading** indicates concentration above the Acute SWQC.

**Table 9-14**  
**Metals in Surface Water**  
**Chevron Perth Amboy, New Jersey**

TRC RAVIV Sample No.:	SW-3-C (F)	SW-3-C (U)	SW-2-C (F)	SW-2-C (U)	SW-1-C (F)	SW-1-C (U)	SW-16-C (F)	SW-16-C (U)
Date Sampled:	12/18/02	12/18/02	12/18/02	12/18/02	12/18/02	12/18/02	12/17/02	12/17/02
Lab Sample No.:	3965769	3965745	3965768	3965744	3965767	3965743	3964475	3964469
Laboratory:	Lancaster	Lancaster						

TAL-Metal (ppb)	Abbrev.	Chronic SWQC <sup>(1)</sup>	Acute SWQC <sup>(1)</sup>	Woodbridge Creek								Arthur Kill							
				⇒	⇒	⇒	Woodbridge Creek				⇒	Arthur Kill	⇒						
Aluminum	Al	--	--	47.7	U	191	J	47.7	U	273		47.7	U	143	J	47.7	U	76.1	J
Antimony	Sb	500*	1500*	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U
Arsenic	As	36 <sup>(2)</sup>	69 <sup>(2)</sup>	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U
Barium	Ba	--	--	23	J	26.0	J	17.3	J	20.8	J	16.3	J	18.1	J	16.3	J	18.2	J
Beryllium	Be	--	--	0.5	U	0.50	U	0.5	U	0.50	U	0.5	U	0.50	U	0.5	U	0.50	U
Cadmium	Cd	9.3 <sup>(2)</sup>	42 <sup>(2)</sup>	0.94	U	0.94	U	0.94	U	0.94	U	0.94	U	0.94	U	0.94	U	0.94	U
Calcium	Ca	--	--	196000		203000		234000		242000		245000		246000		231000		232000	
Chromium, Total (+6)	Cr	50 <sup>(2)</sup>	1,100 <sup>(2)</sup>	2	U	2.0	U	2	U	2.0	U	2	U	2.0	U	2	U	2.0	U
Cobalt	Co	--	--	1.7	U	1.7	U	1.7	U	1.7	U	2.9	J	1.7	U	1.7	U	1.7	U
Copper	Cu	5.6 <sup>(2)</sup>	7.9 <sup>(2)</sup>	2.6	U	11.2	J	2.6	U	11.8	J	2.6	U	8.1	J	2.6	U	4	J
Iron	Fe	--	--	34.9	U	407		34.9	U	564		34.9	U	338		34.9	U	178	
Lead	Pb	8.1 <sup>(2)</sup>	210 <sup>(2)</sup>	8.9	U	8.9	U	8.9	U	8.9	U	8.9	U	8.9	U	8.9	U	8.9	U
Magnesium	Mg	--	--	578000		584000		722000		724000		764000		761000		711000		693000	
Manganese	Mn	--	--	80		89.9		38.3		53.2		28.6		40.9		25.4		35.3	
Mercury	Hg	0.025 <sup>(3)</sup>	1.8 <sup>(2)</sup>	0.079	U	0.079	U	0.079	U	0.079	U	0.079	U	0.079	U	0.079	U	0.079	U
Nickel	Ni	8.2 <sup>(2)</sup>	74 <sup>(2)</sup>	13.9	J	17.9	J	1.9	U	7.3	J	1.9	U	3.2	J	1.9	U	1.9	U
Potassium	K	--	--	211000		200000		260000		257000		268000		261000		246000		237000	
Selenium	Se	71 <sup>(2)</sup>	290 <sup>(2)</sup>	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U
Silver	Ag	--	1.9	1.4	U	1.4	U	1.4	U	1.4	U	1.6	J	1.4	U	1.4	U	1.4	U
Sodium	Na	--	--	4960000		4760000		6000000		5970000		6250000		5810000		5660000		5490000	
Thallium	Tl	--	2130*	9.5	U	9.5	U	9.5	U	9.5	U	9.5	U	9.5	U	9.5	U	9.5	U
Vanadium	V	--	--	1.7	U	3.5	J	2.3	J	4.2	J	2.4	J	3.5	J	1.9	J	3.5	J
Zinc	Zn	81 <sup>(2)</sup>	90 <sup>(2)</sup>	22.1	J	33.2		8.2	J	22.5	J	4.9	U	14.6	J	4.9	U	10.3	J

U = The compound was not detected at the indicated concentration.

J = An Estimated Value.

(U) = Denotes unfiltered sample (Total Recoverable)

(F) = Denotes filtered sample (Dissolved)

(+6) = Criterion for Chromium +6.

<sup>(1)</sup> The most stringent of either the NJDEP or EPA surface water quality criteria (SWQC) for saltwater were chosen for comparative use. Standards adapted from comparison of 40 CFR - Chapter I - Part 131, Section 131.36(b); (February 7, 2003) and New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B, April 17, 1998).

<sup>(2)</sup> = Criteria apply to dissolved metal concentrations only per NJDEP's 2/28/03 SWQS memorandum.

<sup>(3)</sup>=Criteria apply to total recoverable metal concentrations only per NJDEP's 2/28/03 SWQS memorandum.

\* When no criteria were available from NJDEP or EPA, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

(--) = No applicable criteria available.

**Bold** indicates concentration above the Chronic SWQC.

**Bold and Shading** indicates concentration above both Acute and Chronic SWQC.

**Table 9-14**  
**Metals in Surface Water**  
**Chevron Perth Amboy, New Jersey**

TRC RAVIV Sample No.: SW-13-C (F)	SW-13-C (U)	SW-14-C (F)	SW-14-C (U)	SW-14-CD (F)	SW-14-CD (U)	SW-15-C (F)	SW-15-C (U)
Date Sampled: 12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02
Lab Sample No.: 3964472	3964466	3964473	3964467	3964474	3964468	3964471	3964465
Laboratory: Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

TAL-Metal (ppb)	Abbrev.	Chronic SWQC <sup>(1)</sup>	Acute SWQC <sup>(1)</sup>	Arthur Kill															
				→	→	→	→	→	→	→	→								
Aluminum	Al	--	--	47.7	U	47.7	U	47.7	U	87.5	J	47.7	U	92.0	J				
Antimony	Sb	500*	1500*	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U	9.9	U				
Arsenic	As	36 <sup>(2)</sup>	69 <sup>(2)</sup>	4.9	U	4.9	U	4.9	U	4.9	U	4.9	U	5.1	J				
Barium	Ba	--	--	14.5	J	16.3	J	15.1	J	17.6	J	15	J	16.9	J	16.3	J	18.1	J
Beryllium	Be	--	--	0.5	U	0.50	U	0.5	U	0.50	U	0.5	U	0.50	U	0.5	U	0.50	U
Cadmium	Cd	9.3 <sup>(2)</sup>	42 <sup>(2)</sup>	0.94	U	0.94	U	0.94	U	0.94	U	0.94	U	0.94	U	0.94	U	0.94	U
Calcium	Ca	--	--	245000		248000		247000		261000		248000		246000		240000		248000	
Chromium, Total (+6)	Cr	50 <sup>(2)</sup>	1,100 <sup>(2)</sup>	2	U	2.0	U	2	U	2.0	U	2	U	2.0	U	2	U	2.0	U
Cobalt	Co	--	--	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
Copper	Cu	5.6 <sup>(2)</sup>	7.9 <sup>(2)</sup>	2.6	U	3.6	J	2.6	U	3.9	J	2.6	U	4.1	J	2.6	U	3.2	J
Iron	Fe	--	--	34.9	U	107		34.9	U	143		34.9	U	172		34.9	U	146	
Lead	Pb	8.1 <sup>(2)</sup>	210 <sup>(2)</sup>	8.9	U	8.9	U	8.9	U	8.9	U	8.9	U	8.9	U	8.9	U	8.9	U
Magnesium	Mg	--	--	782000		760000		779000		754000		781000		746000		768000		742000	
Manganese	Mn	--	--	14.2		25.0		16.8		28.9		16.8		27.3		18.2		28.9	
Mercury	Hg	0.025 <sup>(3)</sup>	1.8 <sup>(2)</sup>	0.079	U	0.079	U	0.079	U	0.079	U	0.079	U	<b>0.096</b>	J	0.079	U	0.079	U
Nickel	Ni	8.2 <sup>(2)</sup>	74 <sup>(2)</sup>	1.9	U	2.0	J	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
Potassium	K	--	--	272000		265000		265000		258000		271000		258000		274000		272000	
Selenium	Se	71 <sup>(2)</sup>	290 <sup>(2)</sup>	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U	4.8	U
Silver	Ag	--	1.9	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U	1.4	U
Sodium	Na	--	--	6270000		6150000		6440000		6150000		6550000		6030000		6280000		6170000	
Thallium	Tl	--	2130*	9.5	U	9.5	U	9.5	U	9.5	U	9.5	U	9.5	U	9.5	U	9.5	U
Vanadium	V	--	--	2.2	J	3.3	J	2.6	J	4.1	J	2.2	J	3.1	J	2.9	J	3.9	J
Zinc	Zn	81 <sup>(2)</sup>	90 <sup>(2)</sup>	4.9	U	7.6	J	4.9	U	8.5	J	4.9	U	7.9	J	4.9	U	7.7	J

U = The compound was not detected at the indicated concentration.

J = An Estimated Value.

(U) = Denotes unfiltered sample (Total Recoverable)

(F) = Denotes filtered sample (Dissolved)

(+6) = Criterion for Chromium +6.

<sup>(1)</sup> The most stringent of either the NJDEP or EPA surface water quality criteria (SWQC) for saltwater were chosen for comparative use. Standards adapted from comparison of 40 CFR - Chapter I - Part 131, Section 131.36(b); (February 7, 2003) and New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B, April 17, 1998).

<sup>(2)</sup> = Criteria apply to dissolved metal concentrations only per NJDEP's 2/28/03 SWQS memorandum.

<sup>(3)</sup>=Criteria apply to total recoverable metal concentrations only per NJDEP's 2/28/03 SWQS memorandum.

\* When no criteria were available from NJDEP or EPA, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

(--) = No applicable criteria available.

**Bold** indicates concentration above the Chronic SWQC.

**Bold and Shading** indicates concentration above the Acute SWQC.

**Table 9-14**  
**Metals in Surface Water**  
**Chevron Perth Amboy, New Jersey**

TRC RAVIV Sample No.: SW-17-C (F)	SW-17-C (U)	FB121802 (F)	FB121802 (U)
Date Sampled:	12/17/02	12/17/02	12/18/02
Lab Sample No.:	3964476	3964470	3965776
Laboratory:	Lancaster	Lancaster	Lancaster

TAL-Metal (ppb)	Abbrev.	Chronic SWQC <sup>(1)</sup>	Acute SWQC <sup>(1)</sup>	Arthur Kill ➔		Field Blank	
Aluminum	Al	--	--	47.7	U	47.7	U
Antimony	Sb	500*	1500*	9.9	U	9.9	U
Arsenic	As	36 <sup>(2)</sup>	69 <sup>(2)</sup>	4.9	U	5.5	J
Barium	Ba	--	--	15.6	J	16.7	J
Beryllium	Be	--	--	0.5	U	0.50	U
Cadmium	Cd	9.3 <sup>(2)</sup>	42 <sup>(2)</sup>	0.94	U	0.94	U
Calcium	Ca	--	--	247000		232000	
Chromium, Total (+6)	Cr	50 <sup>(2)</sup>	1,100 <sup>(2)</sup>	2	U	2.0	U
Cobalt	Co	--	--	1.7	U	1.7	U
Copper	Cu	5.6 <sup>(2)</sup>	7.9 <sup>(2)</sup>	2.6	U	3.8	J
Iron	Fe	--	--	34.9	U	106	
Lead	Pb	8.1 <sup>(2)</sup>	210 <sup>(2)</sup>	8.9	U	8.9	U
Magnesium	Mg	--	--	740000		711000	
Manganese	Mn	--	--	21.2		29.7	
Mercury	Hg	0.025 <sup>(3)</sup>	1.8 <sup>(2)</sup>	0.079	U	0.079	U
Nickel	Ni	8.2 <sup>(2)</sup>	74 <sup>(2)</sup>	1.9	U	1.9	U
Potassium	K	--	--	257000		245000	
Selenium	Se	71 <sup>(2)</sup>	290 <sup>(2)</sup>	4.8	U	4.8	U
Silver	Ag	--	1.9	1.4	U	1.4	U
Sodium	Na	--	--	5980000		5850000	
Thallium	Tl	--	2130*	9.5	U	9.5	U
Vanadium	V	--	--	1.7	U	3.2	J
Zinc	Zn	81 <sup>(2)</sup>	90 <sup>(2)</sup>	4.9	U	9.1	J
						4.9	U
						4.9	U

U = The compound was not detected at the indicated concentration.

J = An Estimated Value.

(U) = Denotes unfiltered sample (Total Recoverable)

(F) = Denotes filtered sample (Dissolved)

(+6) = Criterion for Chromium +6.

<sup>(1)</sup> The most stringent of either the NJDEP or EPA surface water quality criteria (SWQC) for saltwater were chosen for comparative use. Standards adapted from comparison of 40 CFR - Chapter I - Part 131, Section 131.36(b); (February 7, 2003) and New Jersey Surface Water Quality Standards (N.J.A.C. 7:9B, April 17, 1998).

<sup>(2)</sup> = Criteria apply to dissolved metal concentrations only per NJDEP's 2/28/03 SWQS memorandum.

<sup>(3)</sup> = Criteria apply to total recoverable metal concentrations only per NJDEP's 2/28/03 SWQS memorandum.

\* When no criteria were available from NJDEP or EPA, the September 1999 NOAA "Screening Quick Reference Tables" were substituted.

(--) = No applicable criteria available.

**Bold** indicates concentration above the Chronic SWQC.

**Bold and Shading** indicates concentration above the Acute SWQC.

**Table 9-15**  
**General Chemistry in Surface Water**  
**Chevron Perth Amboy, New Jersey**

TRC Sample No.:	SW-11-C	SW-8-C	SW-7-C	SW-10-C	SW-9-C	SW-6-C	SW-5-C	SW-4-C	SW-3-C
Date Sampled:	12/18/02	12/18/2002	12/18/02	12/19/02	12/18/2002	12/18/02	12/18/02	12/18/02	12/18/02
Lab Sample No.:	3965749	3965750	3965751	3966062	3965777	3965748	3965747	3965746	3965745
Laboratory:	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster	Lancaster

General Chemistry	Acute SWQC	Chronic SWQC	Flow Direction	Spa Spring Creek		Woodbridge Creek							
				⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒
Turbidity (ntu)	--	--		27.0	13.9	18.8	11.1	10.5	4.33	6.05	7.22	3.82	
Total Suspended Solids (mg/l)	NRU	NRU		32	12	55	15	26	19	15	13	14	
Total Hardness (mg/l)	--	--		219	284	361	1970	905	2170	2760	3180	3300	
Sulfate (turbidimetric) (mg/l)	--	--		89	152	179	810	382	830	1020	1210	1270	
Nitrite Nitrogen (mg/l)	--	--		0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	
Nitrate Nitrogen (mg/l)	--	--		0.38	0.55	0.61	0.78	0.8	0.73	0.73	0.72	0.66	
Kjeldahl Nitrogen (mg/l)	--	--		1.3	0.64 J	0.7 J	1	0.92 J	0.91 J	1	1 J	1.1	
Chloride (titrimetric) (mg/l)	--	--		133	453	687	6620	2980	6600	8130	9490	9600	
Ammonia Nitrogen (mg/l)	--	--		0.68 J	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.54 J	0.6 J	
*Ammonia (unionized) (mg/l)	0.115	0.03		0.0006	0.0002	0.0003	0.0002	0.0014	0.0012	0.0013	0.0015	0.002	

TRC Sample No.:	SW-2-C	SW-1-C	SW-16-C	SW-13-C	SW-14-C	SW-14-CD	SW-15-C	SW-17-C	FB121802
Date Sampled:	12/18/02	12/18/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/02	12/17/2002	12/18/2002
Lab Sample No.:	3965744	3965743	3964469	3964466	3964467	3964468	3964465	3964470	3965752
Laboratory:	Lancaster	Lancaster							

General Chemistry	Acute SWQC	Chronic SWQC	Woodbridge Creek	Arthur Kill								Field Blank
				⇒	⇒	⇒	⇒	⇒	⇒	⇒	⇒	
Turbidity (ntu)	--	--		1.46	4.41	2.84	1.37	1.14	1.34	2.17	1.23	NA
Total Suspended Solids (mg/l)	NRU	NRU		14	13	4.8 J	3.2 J	5.2 J	5.6 J	5.2 J	5.2 J	NA
Total Hardness (mg/l)	--	--		4070	4030	3530	3900	3720	3700	3810	3700	0.42 U
Sulfate (turbidimetric) (mg/l)	--	--		1550	1530	1470	1650	1630	1630	1700	1520	NA
Nitrite Nitrogen (mg/l)	--	--		0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	
Nitrate Nitrogen (mg/l)	--	--		0.69	0.67	0.72	0.64	0.59	0.59	0.64	0.69	0.04 U
Kjeldahl Nitrogen (mg/l)	--	--		0.89 J	1.2	1.6	1.4	1.4	1.1	1.5	1.5	0.3 U
Chloride (titrimetric) (mg/l)	--	--		11800	12000	10900	12800	12500	11900	11600	11600	NA
Ammonia Nitrogen (mg/l)	--	--		0.6 J	0.69 J	0.46 U	0.46 U	0.46 U	0.46 U	0.55 J	0.46 U	0.46 U
*Ammonia (unionized) (mg/l)	0.115	0.03		0.0027	0.0023	0.0025	0.0026	0.0024	0.0028	0.0023	0.0024	0.0006

NA = Not Analyzed

U = The compound was not detected at the indicated concentration.

J = An Estimated Value.

SWQC = Applicable Surface Water Quality Criteria for Saltwater.

(--) = No Applicable Criteria Available.

NRU = None which would render the waters unsuitable for their designated uses.

\*Unionized Ammonia has been calculated using the equations presented in Appendix A. The MDL value was used where Total Ammonia Nitrogen was not detected.

**2003 RFI**

**Sediment Boring Logs**



 TRC Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

**CORE NUMBER**

SED-1-A

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/20/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelk

**PROJECT NO.:** 03C2269      **Contractor:** EEA, Inc.      **LOGGED BY:** Rose Tripodi

**Contractor:** EEA, Inc. **LOGGED BY:** Rose Tripodi

**SAMPLER/DIAMETER (IN):** 4" soft plastic sleeve

ELEVATION REFERENCE: water surface

ELEVATION REFERENCE: water surface

PENETRATION (FT): 6

LATITUDE (N): 40.53849

LATITUDE (N): 40.53849

**RECOVERY (FT)** 45

LONGITUDE (W):

LONGITUDE (W): 74.25824



**41 Spring Street, New Providence, NJ 07974 (908)988-1700**

VIBRACORE LOG

**CORE NUMBER**

SED-1-B

PAGE No. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/20/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelk

PROJECT NO.: 03C2269 Contractor: EEA, Inc. LOGGED BY: Rose Tripodi

PROJECT NO.: 03C2269 Contractor: EEA, Inc. LOGGED BY: Rose Tripodi

SAMPLER DIAMETER (IN): 4" soft plastic sleeve

ELEVATION REFERENCE: water surface

SAMPLER/DIAMETER (IN.) 4 soft plastic sleeve

**EL E V A T I O N R E F E R E N C E:** water surface

PENETRATION (F1): 5

LATITUDE (N): 40.53854

**RECOVERY (FT)** 2

**LONGITUDE (W):** 74.25799





 TRC Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

**CORE NUMBER**

SED-2-A

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/20/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelk

**PROJECT NO.:** 03C2269      **Contractor:** EEA, Inc.      **LOGGED BY:** Rose Tripodi

**Contractor:** EEA, Inc. **LOGGED BY:** Rose Tripodi

**SAMPLER/DIAMETER (IN):** 4" soft plastic sleeve

ELEVATION REFERENCE: water surface

PENETRATION (FT): 6

LATITUDE (N): 40.53878

**RECOVERY (FT)** 4

**LONGITUDE (W):** 74.26063







 TRC Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

**CORE NUMBER**

SED-3-A

PAGE No. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelk

PROJECT NO.: 03C2269 Contractor: EEA, Inc. LOGGED BY: Rose Tripodi

PROJECT NO.: 03C2269 Contractor: EEA, Inc. LOGGED BY: Rose Tripodi

SAMPLER/DIAMETER (IN): 4" soft plastic sleeve

ELEVATION REFERENCE: water surface

**PENETRATION (FT)** 6

**EL E V A T I O N R E F E R E N C E:** water surface

PENETRATION (FT): 0

**LATITUDE (N):** 40.54033

RECOVERY (FT) 4.25

LONGITUDE (W): 74.26269





**41 Spring Street, New Providence, NJ 07974 (908)988-1700**

## VIBRACORE LOG

**CORE NUMBER**

**SED-3-C**

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelkey

**PROJECT NO.:** 03C2269      **Contractor:** EEA, Inc.      **LOGGED BY:** Rose Tripodi

[View Details](#) | [Edit](#) | [Delete](#)

**LOGGED BY:** Rose Tripod

SAMPLER/DIAMETER (IN): 4" soft plastic sleeve

**ELEVATION REFERENCE:** water surface

PENETRATION (FT): 6

LATITUDE (N): 40 54023

PERCENTILE (P<sub>50</sub>)

**LATITUDE (N.)**      46.0-4620  
**LONGITUDE (W.)**      74.000000

**RECOVERY (FT)** 5

**LONGITUDE (W):** 74.26299





 TRC Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

**CORE NUMBER**

SED-4-B

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

PROJECT NO.: 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelkey

PROJECT NO.: 03C2269

**Contractor:** EEA, Inc.

**LOGGED BY:** Rose Tripodi

SAMPLER/DIAMETER (IN): 4" soft plastic sleeve

**LEVELING SURVEY**

**EL EVELATION REFERENCE:** water surface

PENETRATION (FT): 1

---

LATITUDE (N): 40 54.097

PERCENTILE (PP) 97.5

LATITUDE (N) 40.84887  
LONGITUDE (W) -74.26646

RECOVERY (FT) 0.75

LONGITUDE (W): 74.26343



41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

## CORE NUMBER

SED-4-C

PAGE No. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelk

**PROJECT NO.:** 03C2269      **Contractor:** EEA, Inc.      **LOGGED BY:** Rose Tripodi

**PROJECT NO.:** 03C2269      **Contractor:** EEA, Inc.      **LOGGED BY:** Rose Tripodi

SAMPLER/DIAMETER (IN): 4" soft plastic sleeve

ELEVATION REFERENCE: water surface

PENETRATION (FT): 6

**ELEVATION REFERENCE:** Water surface  
**LATITUDE (N):** 40.54000

RECOVERY (FT) 3.5

LATITUDE (N) 40.81000  
LONGITUDE (W) -74.26251

MEAN LOW WATER DEPTH (FT) 3.5

ESTIMATED ERROR POSITION (FT): 13



 TRC Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

**CORE NUMBER**

SED-5-A

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelk

PROJECT NO.: 03C2269 Contractor: EEA, Inc. LOGGED BY: Rose Tripodi

**Contractor:** EEA, Inc. **LOGGED BY:** Rose Tripodi

**LOGGED BY:** Rose Tripodi

SAMPLER/DIAMETER (IN): 4" soft plastic sleeve

**ELEVATION REFERENCE:** water surface

PENETRATION (FT): 6

LATITUDE (N): 40.54160

PERCENTILE (P<sub>10</sub>) 6.5

LATITUDE (N): 40.81160  
LONGITUDE (W): -74.22424

RECOVERY (FT) 3.5

LONGITUDE (W): 74.26424



Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

CORE NUMBER

SED-5-B

PAGE No. 1 OF 1

PROJECT NAME:	Chevron	Location:	Perth Amboy, New Jersey	DATE CORED:	12/19/02
PROJECT NO.:	03C2269	Contractor:	EEA, Inc.	OPERATOR:	Jeff Shelkey
				LOGGED BY:	Rose Tripodi

SAMPLER/DIAMETER (IN):	4" soft plastic sleeve	ELEVATION REFERENCE:	water surface
PENETRATION (FT):	5	LATITUDE (N):	40.54161
RECOVERY (FT)	2	LONGITUDE (W):	74.26438
MEAN LOW WATER DEPTH (FT):	.2.2	ESTIMATED ERROR POSITION (FT):	12

DEPTH FROM TOP OF SEDIMENT (FEET)	SAMPLE DESIGNATION	PID (ppm)	LITHOLOGIC CLASSIFICATION AND COMMENTS
1	SED-5-B\0-6	ND	0-1.75' Gravelly sand with some rounded pebbles and shell fragments, loose, saturated. No staining nor odors.
	SED-5-B\6-12	ND	
		ND	1.75-5.0' Light gray clay, soft with medium plasticity, moist.
		ND	
			END OF CORE @ 5.0 ft



 TRC Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

**CORE NUMBER**

SED-5-C

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

PROJECT NO.: 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelk

**PROJECT NO.:** 03C2269      **Contractor:** EEA, Inc.      **LOGGED BY:** Rose Tripodi

PROJECT NO.: 03C2269 Contractor: EEA, Inc. LOGGED BY: Rose Tripodi

SAMPLER/DIAMETER (IN): 4" soft plastic sleeve

ELEVATION REFERENCE: water surface

PENETRATION (FT) 6

ELEVATION REFERENCE: water surface  
LATITUDE (N) 40.54156

PENETRATION (FT): 0

LATITUDE (N): 40.54150

RECOVERY (FT) 3.5

LONGITUDE (W): 74.26453



 TRC Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

CORE NUMBER

SED-6-A

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

PROJECT NO.: 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelk

PROJECT NO.: 03C2269 Contractor: EEA, Inc. LOGGED BY: Rose Tripodi

**PROJECT NO.:** 03C2269      **Contractor:** EEA, Inc.      **LOGGED BY:** Rose Tripodi

SAMPLER DIAMETER (IN): 4" soft plastic sleeve

ELEVATION REFERENCE: water surface

SAMPLER/DIAMETER (IN.) 4 soft plastic sleeve

**EL E V A T I O N R E F E R E N C E:** water surface

PENETRATION (F1): 4

LATITUDE (N): 40.54299

**RECOVERY (FT)** 2

**LONGITUDE (W):** 74.26441



 TRC Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

**CORE NUMBER**

SED-6-B

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelk

PROJECT NO.: 03C2269

**Contractor:** EEA, Inc.

LOGGED BY: Rose Trip

SAMPLER/DIAMETER (IN): 4" soft plastic sleeve

**ELEVATION REFERENCE:** water surface

PENETRATION (FT): 5.5

LATITUDE (N): 40.54299

PERCENTILE (PP) 4.85

LATITUDE (N) 46.84233  
LONGITUDE (W) -74.22454

RECOVERY (FT) 4.25

LONGITUDE (W): 74.26454



 TRC Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

## CORE NUMBER

**SED-6-C**

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

PROJECT NO.: 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelkey

**PROJECT NO.:** 03C2269      **Contractor:** EEA, Inc.      **LOGGED BY:** Rose Tripodi

SAMPLER DIAMETER (IN): 4" soft plastic sleeve

**ELEVATION REFERENCE:** water surface

**LOGGED BY:** Rose Tripodi

PENETRATION (FT): 6

LATITUDE (N): 40.54301

RECOVERY (FT)                  4.25

**LONGITUDE (W):** 74.26471

MEAN LOW WATER DEPTH (FT): 0.3

**ESTIMATED ERROR POSITION (FT):**



**41 Spring Street, New Providence, NJ 07974 (908)988-1700**

## VIBRACORE LOG

**CORE NUMBER**

SED-7-A

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/20/02

PROJECT NO.: 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelkey

PROJECT NO.: 03C2269 Contractor: EEA, Inc. LOGGED BY: Rose Tripodi

SAMPLER DIAMETER (IN): 4" soft plastic sleeve

**Contractor:** EEA, Inc.

**LOGGED BY:** Rose Tripodi

PENETRATION (FT): 4

EL E V A T I O N R E F E R E N C E: water surface

---

**RECOVERY (ET)**

LONGITUDE (W) 34.26811



 WRC Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

**CORE NUMBER**

SED-7-B

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/20/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelk

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**LOGGED BY:** Rose Trippe

SAMPLER/DIAMETER (IN): 4" soft plastic sleeve

**ELEVATION REFERENCE:** water surface

PENETRATION (FT): 35

LATITUDE (N): 40 54412

PENETRATION (PT) 6.0

**LATITUDE (N.)** 48.044412

**LONGITUDE (W.)** 74.222222

RECOVERY (FT) 2.5

LONGITUDE (W): 74.26808



 TRC Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

# VIBRACORE LOG

**CORE NUMBER**

SED-7-C

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/20/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelk

**PROJECT NO.:** 03C2269      **Contractor:** EEA, Inc.      **LOGGED BY:** Rose Tripodi

PROJECT NO.: 03C2269 Contractor: EEA, Inc. LOGGED BY: Rose Tripodi

**SAMPLER/DIAMETER (IN):** 4" soft plastic sleeve

ELEVATION REFERENCE: water surface

PENETRATION (FT): 3

ELEVATION REFERENCE: water surface

RECOVERY (FT) 2.5

LATITUDE (N) 40.84444  
LONGITUDE (W) -74.26810

MEAN LOW WATER DEPTH (FT) 0.1

ESTIMATED ERROR POSITION (FT) 18



 TRC Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

CORE NUMBER

SED-8-A

PAGE No. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

**DATE CORED:** 12/20/02

PROJECT NO.: 03C2269

**Contractor:** EEA, Inc.

OPERATOR: Jeff Shekley

**ANSWER** The answer is 1000.

---

---

LOGGED BY: Rose Tripodi

**SAMPLER/DIAMETER (IN):** 4" soft plastic sleeve

**ELEVATION REFERENCE:** water surface

— 1 —

PENETRATION (FT): 5.5

LATITUDE (N): 40.54344

**RECOVERY (FT)** 2.5

**LONGITUDE (W):** 74.27031

MEAN LOW WATER DEPTH (FT): -1.7

**ESTIMATED ERROR POSITION (FT):**

**DEPTH FROM**  **FEET**

Digitized by srujanika@gmail.com





 TRC Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

**CORE NUMBER**

SED-9-A

PAGE No. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

PROJECT NO.: 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelkey

**ANSWER** The answer is 1000.

[View Details](#) | [Edit](#) | [Delete](#)

LOGGED BY: Rose Tripodi

**SAMPLER/DIAMETER (IN):** 4" soft plastic sleeve

**ELEVATION REFERENCE:** water surface

**LOGGED BY:** Rose Tripodi

SAMPLER/DIAMETER (IN): 4" soft plastic sleeve

**ELEVATION REFERENCE:** water surface

PENETRATION (FT): 6

**LATITUDE (N):** 40.54628

10 of 10



**41 Spring Street, New Providence, NJ 07974 (908)988-1700**

## VIBRACORE LOG

**CORE NUMBER**

**SED-9-B**

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelkey

**ANSWER** The answer is 1000. The first two digits of the product are 10.

[View Details](#) | [Edit](#) | [Delete](#)

**LOGGED BY:** Rose Tripodi

**SAMPLER/DIAMETER (IN):** 4" soft plastic sleeve

**ELEVATION REFERENCE:** water surface

— 1 —

PENETRATION (FT): 6.5

LATITUDE (N): 40.54623

**RECOVERY (FT)** 4.25

**LONGITUDE (W):** 74.26859

MEAN LOW WATER DEPTH (FT): 1.1

**ESTIMATED ERROR POSITION (FT):**

DEPTH FROM TOP OF	SAMPLE	PID
----------------------	--------	-----

[View Details](#) | [Edit](#) | [Delete](#)



41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

## CORE NUMBER

**SED-9-C**

PAGE No. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

PROJECT NO.: 03C2269

**Contractor:** EEA, Inc.

OPERATOR: Ben Shorkey

**ANSWER** The answer is 1000.

---

---

**LOGGED BY:** Rose Tripodi

**SAMPLER/DIAMETER (IN):** 4" soft plastic sleeve

**ELEVATION REFERENCE:** water surface

**LOGGED BY:** Rose Tripodi

PENETRATION (FT): 6

LATITUDE (N): 40.54636

**RECOVERY (FT)** 5

**LONGITUDE (W):** 74.26860

MEAN LOW WATER DEPTH (FT): -1.1

**ESTIMATED ERROR POSITION (FT):**

DEPTH FROM TOP OF SEDIMENT (FEET)	SAMPLE DESIGNATION	PID (ppm)	LITHOLOGIC CLASSIFICATION AND COMMENTS	
	SED-9-C10-6	0.5 13.7 1 15.8 1.5 41.7 2 30.8 2.5 28.8 3	0-2.75'	Black silt with organics, saturated, staining and odors.
1	SED-9-C16-12	189	2.75-3.0'	Distinct meadowmat layer with product globules, strong staining and odors.
2		3.5 263 4 523	3.0-4.0'	Gray silty clay with organics, moist, staining and odors.
3	SED-9-C133-39	4.5 501 5 218	4.0-6.0'	Black organic silty clay, very soft, staining and odors.
4				
5				
6				
				END OF CORE @ 6.0 ft



**41 Spring Street, New Providence, NJ 07974 (908)988-1700**

## VIBRACORE LOG

**CORE NUMBER**

SED-10-A

PAGE No. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Sheekey

**PROJECT NO.:** 03C2269      **Contractor:** EEA, Inc.      **LOGGED BY:** Rose Tripodi

SAMPLE DOCUMENTATION PAGE 41 - soft landing page

TECHNICAL REFERENCES 1000-1000

SAMPLER/DIAMETER (IN): 4" soft plastic sleeve

ELEVATION REFERENCE: water surface

PENETRATION (FT): 5

LATITUDE (N): 40.55490

RECOVERY (FT)                  4

**LONGITUDE (W):** 74.26707



41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

## CORE NUMBER

SED-10-B

PAGE No. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/19/02

PROJECT NO.: 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelk

**PROJECT NO.:** 03C2269      **Contractor:** EEA, Inc.      **LOGGED BY:** Rose Tripodi

**PROJECT NO.:** 03C2269      **Contractor:** EEA, Inc.      **LOGGED BY:** Rose Tripodi

SAMPLER/DIAMETER (IN):	4" soft plastic sleeve	ELEVATION REFERENCE:	water surface
PENETRATION (FT):	4.5	LATITUDE (N):	40.55488
RECOVERY (FT)	2.75	LONGITUDE (W):	74.26712
MEAN LOW WATER DEPTH (FT):	-0.3	ESTIMATED ERROR POSITION (FT):	17





**41 Spring Street, New Providence, NJ 07974 (908)988-1700**

## VIBRACORE LOG

**CORE NUMBER**

**SED-11-C**

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/20/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelkey

PROJECT NO.: 03C2269

**Contractor:** EEA, Inc.

LOGGED BY: Rose Tripodi

SAMPLER/DIAMETER (IN): 4" soft plastic sleeve

**LEVELING SURVEY**

**EL ELEVATION REFERENCE:** water surface

PENETRATION (FT): 6

---

LATITUDE (N): 40.54263

RECOVERY (FT) 4.5

LONGITUDE (W): 74.27082

MEAN LOW WATER DEPTH (FT): -2.3

ESTIMATED ERROR POSITION (FT): 15



Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

CORE NUMBER

SED-13-C

PAGE No. 1 OF 1

PROJECT NAME:	Chevron	Location:	Perth Amboy, New Jersey	DATE CORED:	12/17/02
PROJECT NO.:	03C2269	Contractor:	EEA, Inc.	OPERATOR:	Jeff Shelkey
				LOGGED BY:	Chris Hoen

SAMPLER/DIAMETER (IN):	4" soft plastic sleeve	ELEVATION REFERENCE:	water surface
PENETRATION (FT):	8	LATITUDE (N):	40° 32.233'
RECOVERY (FT)	8	LONGITUDE (W):	74° 15.238'
MEAN LOW WATER DEPTH (FT):	.21.8		

DEPTH FROM TOP OF SEDIMENT (FEET)	SAMPLE DESIGNATION	PID (ppm)	LITHOLOGIC CLASSIFICATION AND COMMENTS
	SED-13-C10-6	ND	0 - 8.0' Dark grey silt and clay, very moist to wet, very soft. Stiffens slightly with depth. Faint petroleum odor throughout.
1	SED-13-C16-12	ND	
2		ND	
3		ND	
4		ND	
5		ND	
6		ND	
7		ND	
8		ND	
			END OF CORE @ 8.0 ft
			* Duplicate sample collected.





Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

CORE NUMBER

SED-15-C

PAGE No. 1 OF 1

PROJECT NAME:	Chevron	Location:	Perth Amboy, New Jersey	DATE CORED:	12/17/02
PROJECT NO.:	03C2269	Contractor:	EEA, Inc.	OPERATOR:	Jeff Shelkey
				LOGGED BY:	Chris Hoen

SAMPLER/DIAMETER (IN):	4" soft plastic sleeve	ELEVATION REFERENCE:	water surface
PENETRATION (FT):	8	LATITUDE (N):	40° 31.979'
RECOVERY (FT)	7.75	LONGITUDE (W):	74° 15.176'
MEAN LOW WATER DEPTH (FT):	11.4		

DEPTH FROM TOP OF SEDIMENT (FEET)	SAMPLE DESIGNATION	PID (ppm)	LITHOLOGIC CLASSIFICATION AND COMMENTS
	SED-15-C10-6	ND	0 - 8.0' Dark grey silt and clay, trace rootlets, organic odor. Very moist to wet, soft.
1	SED-15-C16-12	7.6	
		1.5	
2		ND	
3		ND	
4		1.2	
5		ND	
6		ND	
7		ND	
8		ND	
			END OF CORE @ 8.0 ft



41 Spring Street, New Providence, NJ 07974 (908)988-1700

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

CORE NUMBER

SED-16-C

PAGE NO. 1 OF 1

**PROJECT NAME:** Chevron

**Location:** Perth Amboy, New Jersey

DATE CORED: 12/17/02

**PROJECT NO.:** 03C2269

**Contractor:** EEA, Inc.

**OPERATOR:** Jeff Shelkey

SAMPLER/DIAMETER (IN): 4" soft plastic sleeve

**Contractor:** EEA, Inc.

**LOGGED BY:** Mary Gwynn

PENETRATION (FT): 6

**LATITUDE (N):** 40° 32.798'

**RECOVERY (FT)** 3.5

**LONGITUDE (W):** 74° 15.231'

MEAN LOW WATER DEPTH (FT): 12.3

Digitized by srujanika@gmail.com



Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

CORE NUMBER

SED-17-C

PAGE No. 1 OF 1

PROJECT NAME:	Chevron	Location:	Perth Amboy, New Jersey	DATE CORED:	12/17/02
PROJECT NO.:	03C2269	Contractor:	EEA, Inc.	OPERATOR:	Jeff Shelkey
				LOGGED BY:	Chris Hoen

SAMPLER/DIAMETER (IN):	4" soft plastic sleeve	ELEVATION REFERENCE:	water surface
PENETRATION (FT):	8	LATITUDE (N):	40° 31.842'
RECOVERY (FT)	8	LONGITUDE (W):	74° 15.105'
MEAN LOW WATER DEPTH (FT):	NA		

DEPTH FROM TOP OF SEDIMENT (FEET)	SAMPLE DESIGNATION	PID (ppm)	LITHOLOGIC CLASSIFICATION AND COMMENTS	
			1	2
1	SED-17-C10-6	1	0 - 6.0'	Dark grey to black clayey silt, wet, soft with minor layers of gray clay/silt.
2	SED-17-C10-12	1		
3		4		
4		ND		
5		ND		
6		4		
7		ND	6.0 - 8.0'	Grey silty clay.
8		1		
		ND		END OF CORE @ 8.0 ft



Environmental Corporation

41 Spring Street, New Providence, NJ 07974 (908)988-1700

## VIBRACORE LOG

CORE NUMBER

SED-18-C

PAGE No. 1 OF 1

PROJECT NAME:	Chevron	Location:	Perth Amboy, New Jersey	DATE CORED:	12/17/02
PROJECT NO.:	03C2269	Contractor:	EEA, Inc.	OPERATOR:	Jeff Shelkey
				LOGGED BY:	Chris Hoen

SAMPLER/DIAMETER (IN):	4" soft plastic sleeve	ELEVATION REFERENCE:	water surface
PENETRATION (FT):	8	LATITUDE (N):	40° 32.093'
RECOVERY (FT)	7.5	LONGITUDE (W):	74° 15.220'
MEAN LOW WATER DEPTH (FT):	19.1		

DEPTH FROM TOP OF SEDIMENT (FEET)	SAMPLE DESIGNATION	PID (ppm)	LITHOLOGIC CLASSIFICATION AND COMMENTS
	SED-18-C10-6	1.5	0 - 8.0' Dark grey to black clayey silt, no odor. Wet, very and very soft.
1	SED-18-C16-12	1.5	
2		1.6	
3		ND	
4		ND	
5		ND	
6		ND	
7		ND	
8			END OF CORE @ 8.0 ft